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PREFACE

The period here under study roughly covers the Early Iron Age and the Archaic, Classical and Early Hellenistic periods. While some variation can be noticed in the dating of these periods and the exact time frame that they represent, this study will largely follow the chronological scheme proposed by Attema, Burgers and Van Leusen 2010, with some minor changes:

Early Bronze Age	2300 - 1700	BC
Middle Bronze Age	1700 - 1350	BC
Recent Bronze Age	1350 - 1200	BC
Final Bronze Age	1200 - 1000	BC
Early Iron Age	1000 - 600	BC
Archaic Period	600 - 480	BC
Classical Period	480 - 325	BC
Early Hellenistic Period	325 - 200	BC
Late Hellenistic / Early Roman Period	200 - 30	BC

All dates in this study should be considered as years BC, unless otherwise stated.

The descriptions of the characteristics of wild plants that I use are based on Pignatti 1982, Polunin and Huxley 1974 and Polunin 1969. All scientific names can be found in Tables 5.1-5.5.



The research area of this study.

1. Introduction

I.1 ARCHAEOLOGICAL RESEARCH OF LANDSCAPE AND LAND USE IN SOUTHEAST ITALY

The research presented in this thesis is concerned with the period between the end of the Final Bronze Age and the beginning of the Late Hellenistic Period in southeast Italy. *Figure 1.1* shows the part of Italy that constitutes the research area. It consists of the regions around the Gulf of Taranto, including the Salento Isthmus in the southern part of Apulia, the Basilicata (or ancient Lucania) region, the southernmost tip of Campania and the north of Calabria. This area is rather varied in terms of relief, hydrology and vegetation patterns. This partly explains the variation in land use at the sites I will discuss in the pages to follow. The Salento district is largely made up of a slightly undulating plain with light arable soils, which, starting from the Adriatic, rises very gradually to approximately 60 meters above sea level. The coastal zone consists mostly of dunes, low cliffs and lagoons. Toward the south, the plain merges into the more hilly, calcareous landscape of the Serre Leccesi. To the west and north, the Brindisi district encompasses some of the hard limestone spurs of the Murge uplands, a plateau which gradually merges into the Apennine mountain chain.¹ Basilicata, on the other hand, is the most mountainous region in the south of Italy, as it covers an extensive part of the southern Apennines. It is bordered on the east by a large part of the Bradano river depression, which is traversed by numerous streams and declines to the southeastern coastal plains on the Ionian sea.² The north of Calabria consists largely of an alluvial plain, which is delimited in the north by a crescent-shaped mountain range, with few access points to the mountainous hinterland. Inland routes are largely restricted to the wide river beds of the streams entering the plain from the mountains.³

This research covers the entire first millennium BC except for the last two centuries, which represent the Late Hellenistic Period. It was decided to leave this period out because of the unprecedented changes that took place when southern Italy was incorporated in the Roman state.⁴ This study *fits into* a well-established *tradition* of archaeological research in southeast Italy. The processes of urbanization and Greek colonization in particular have long since fascinated archaeologists. Starting in the 8th century BC, small groups of Greek migrants settled along the coast of southern Italy ('Magna Graecia') and established colonies, including Taras (modern Taranto), Metapontion (Metaponto), Siris/Herakleia (Policoro) and Sybaris (Sibari). The archaeological study of this Greek colonization movement has already spawned a huge bibliography,⁵ which is mostly concerned with the colonial Greek cities and the diffusion of Greek art, architecture and town planning.⁶

However, in the past few decades, research on the contemporary indigenous regions has also made a giant leap forward. The investigations by Renato Peroni and Francesco D'Andria in particular have led to important new insights into the processes of urbanization and growing social and economic

¹ Van Joolen 2003, 5-8, Attema, Burgers and Van Leusen 2010, 5.

² Attema, Burgers and Van Leusen 2010, 5.

³ Van Joolen 2003, 13-14, Attema, Burgers and Van Leusen 2010, 5.

⁴ See Yntema 2006.

⁵ Nenci and Vallet 1977-2005.

⁶ Cf. Attema, Burgers and Van Leusen 2010, 119. See in particular Dunbabin 1948, Boardman 1998.

complexity in the inland areas of Basilicata, Calabria and Salento (southern Apulia).⁷ Moreover, the aforementioned focus on urban contexts is currently counterbalanced by an increase in the number of excavations of rural sites and of archaeological field survey projects.⁸ Intensive field survey has proved to be a particularly useful tool in reconstructing the organization of the landscape and changes in settlement patterns and settlement hierarchy.⁹ Italy has a long research tradition of topographical studies (which are mainly concerned with the recording of standing structures¹⁰), but since the early 1980s, the research method of field survey has truly become of age here.¹¹ Notable examples of field surveys in southeast Italy are the projects in the Basentello valley,¹² around the Roman villa sites of San Giovanni di Ruoti¹³ and *masseria Ciccotti*¹⁴ and the Lucanian site of Roccagloriosa.¹⁵ The territory (or *chora*) of the Greek colony of Metapontion has been especially intensely surveyed.¹⁶

The Dutch archaeological projects in southeast Italy have also contributed to this development. Since the early 1980s, the Archaeological Center of VU University Amsterdam (ACVU) and the Groningen Institute of Archaeology (GIA) have conducted a series of excavations and field survey projects in southeast Italy. Large part of this research was carried out within the context of the multi-disciplinary Regional Pathways to Complexity (RPC) project (1997–2009), a comparative assessment of processes of centralization and urbanization in three Italian regions (the Pontine region in Latium, the Salento Isthmus in Apulia and the Sibaritide in Calabria) during the first millennium BC.¹⁷ VU University Amsterdam also undertook smaller-scale survey and excavation projects in the Brindisino and Tarantino, including surveys and excavations in and around the settlements of Muro Tenente and l'Amastuola.¹⁸

It is mainly due to this surge in survey projects that ancient landscapes –as opposed to urban contexts– have become an increasingly important research topic in the archaeology of southeast Italy.¹⁹

⁷ E.g. Peroni 1984; 1994, D'Andria 1988; 1990; 1996. Other overviews of the pre-Roman phases in southeast Italy were produced by Adamesteanu 1974, Greco Pont-randolfo 1982, Bottini 1987, De Juliis 1988, D'Agostino 1989.

⁸ Cf. Renfrew and Bahn 2004, 67–110.

⁹ Intensive surveys include the complete or near-complete coverage of an area at a high resolution, usually by means of systematic field walking. Extensive survey, on the other hand, is characterized by a low-resolution approach in which only selected parts of a larger study area are visited.

¹⁰ A typical example is the *Forma Italiae* project, a long-term series of surveys initiated by the University of Rome in the 1950s and 1960s. These studies concentrate on contiguous survey areas, the so-called 'a tappeto'-method, systematically exploring an entire study area to record archaeological sites. Terrenato (2000, 22–23) has argued that methodological differences between Italian and foreign survey research are still visible today. Whereas the Dutch, British, Canadian and American projects attempt to measure the density of artifact scatters all over the sampled area, most Italian projects use a simpler site-based approach. In other words, Italian survey projects often disregard off-site artifact scatters and focus on the

identification of settlements. According to Terrenato, these different approaches often stand in the way of ambitions to standardize field survey techniques, which would be an important step forward in Italian landscape archaeology.

¹¹ Cf. Barker 1995a, 5–9 for a short overview of the development of survey archaeology in Italy.

¹² Small, Campbell, MacKinnon, Prowse, Sipe 1998, Small 2001.

¹³ Roberto *et al.* 1985, Roberto and Small 1994.

¹⁴ Gualtieri and Fracchia 1993.

¹⁵ Gualtieri and Fracchia 1990, Gualtieri and De Polignac 1991, Fracchia and Ortolani 1993.

¹⁶ Carter 2001, De Siena 2001, Carter 2006, Carter, Prieto and Trelogan 2011.

¹⁷ Attema, Burgers and Van Leusen 2010.

¹⁸ For Muro Tenente and l'Amastuola, see Chapters 2 and 3. Other field surveys and excavation projects by the ACVU were carried out around the settlement of Oria (1981–1983, final report: Yntema 1993), Valesio (1984–1992, final reports: Boersma and Yntema 1987, Boersma *et al.* 1995, Yntema 2001), Muro Maurizio, San Pancrazio and Cellino San Marco (1992–1995, final report: Burgers 1998) and Ostuni (1999–2000: report: Burgers, Attema and Van Leusen 1998).

This type of research is often referred to as ‘landscape archaeology’. The dominant perspective on current landscape studies in the Mediterranean has been inspired by the historian Fernand Braudel.²⁰ Braudel’s theories became the cornerstone of the French school of Annales history, focusing on the interplay between different kinds of histories operating at different timescales, dubbed *événements* (short-term occurrences in political or military history), *conjonctures* (the medium-term change of demographic and economic cycles) and *longue durée* (long-term processes of change of ‘structures’ and the landscape). The goals of landscape archaeology are much the same as those of Annales history, especially on the level of *conjonctures* and *longue durée*.²¹ Several archaeological case studies have shown the potential of the Annales paradigm for landscape archaeology.²² However, Braudel’s ideas have also been criticized by both later generations of Annales historians and post-processual archaeologists. Braudel regarded landscape and social structures as much more important to change than individual human agency, a viewpoint that many considered as a form of environmental and structural determinism. Critics argued that humans can also create, reproduce and cause long-term transformations.²³

The debate about the best strategy for the study of ancient landscapes in Italy continues to this day. The balance between the role of the landscape itself on the one hand, and human agency on the other still forms an important point of discussion. In spite of the great advances in landscape archaeology in the past few decades, no single study exists which considers the *mutual* relationship between man and landscape in long-term processes of change. Human choices affect the landscape, but the natural environment can also determine human behavior, for instance the choice of settlement locations and land use. Archaeological research in the Mediterranean basin has hitherto paid little attention to the natural landscape, although the integration of bioarchaeological data into archaeological research has great potential for the study of landscape and settlement dynamics.

I . 2 A I M S A N D R E S E A R C H Q U E S T I O N S

In short, a closer look at the history of archaeological research shows a change of perspective. Until recently, archaeologists studying the first millennium BC in southeast Italy tended to focus on Greek rather than on indigenous material culture. Over the past decades, this imbalance has been restored. A large and growing body of literature records studies of the inland areas of Basilicata, Calabria and southern Apulia, and the relationships between the indigenous populations living in these areas with the Greek colonial settlements on the coast. A more recent trend in archaeological research in southeast Italy involves the investigation of ancient landscapes, which is illustrated particularly well by the growing number of archaeological field survey projects and excavations of rural sites. Thanks to this development, archaeological research was able to change its focus from short-term historical events (or, in Braudelian terms, *événements*) to long-term developments (*conjonctures* and *longue durée*).

However, these studies generally have one important limitation. Whereas our knowledge of habitation patterns and human impact on the landscape has increased enormously, the basic understanding of what this landscape looked like and how it was used –besides for settlement building– has lagged behind. This was the main reason why, in 2003, it was decided to incorporate archaeobotanical research (the study of archaeological plant remains) into VU University’s archaeological projects in southeast Italy. The results can be found in this thesis. In this study, I intend to use a different approach

¹⁹ See most recently Attema, Burgers and Van Leusen 2010.

²⁰ Bintliff 1989, with further references.

²¹ Braudel 1949. Cf. Barker 1991, 1995a, b, Bintliff 1989, with further references.

²² For example: the Boeotia Survey project in Greece, directed by Bintliff and Snodgrass, see Bintliff *et al.* 1991.

²³ Barker 1991, 3.

to study the occupational history of pre-Roman southeast Italy. Rather than focusing solely on human activities, I will attempt to put the archaeological research data in a broader perspective of developments in landscape exploitation, agricultural production and human impact on the natural landscape. The primary aim of this thesis is to explore how the opportunities offered by the landscape influenced human strategies and how humans altered the landscape in order to adapt it to their needs.

My second aim is of a methodological nature: I wish to show that archaeobotany offers major opportunities for studies of ancient landscapes and their exploitation. Indeed, archaeobotany is a field of research that is slowly coming of age and developing into an independent discipline in Italy and other Mediterranean countries. The first important steps in this process were taken in the 1970s and early 1980s, when archaeobotanical research concentrated on the need to catalogue the finds, and create a general image of the available species.²⁴ Today, this phase of collecting information is slowly coming to an end, making way for synthesizing, regional studies. The research presented in this study clearly fits into this trend, but also wishes to take a step forward, integrating archaeobotanical data into a multidisciplinary research framework.

There is another good reason for this incorporation, namely to avoid certain factors that create bias in archaeobotanical research. As with all archaeological remains, the interpretation of archaeobotanical data should be treated with caution.²⁵ Although the archaeobotanical assemblage from a given site can provide much information, it is not necessarily representative for the actual range of species that may have been present at the time. Indeed, certain plant types are much more frequently found than others because they were more commonly used. This particularly holds true for edible plants, but also for species that are used as medicine, fuel, construction material etc. Moreover, the majority of archaeobotanical assemblages discussed in this study consists of carbonized plant remains. The interpretation of carbonized archaeobotanical remains brings its own set of problems, since not all plant remains have the same chance of survival. A considerable quantity of publications has been dedicated to these complications.²⁶ Plant species that had no economical value, such as wild herbs, are less likely to have been preserved in the archaeobotanical assemblage. In order to overcome these biases, this study will integrate archaeobotanical studies with information from archaeological excavations, field surveys, ancient written sources, and archaeozoological studies.

To attain the underlying aims, this study will focus on three major research themes in particular.

1. Long-term developments in landscape and land use that took place in southeast Italy between ca. 1000 and 200 BC. In this period, the region underwent major processes of change connected to Greek colonization, urbanization and the arrival of the Romans. These developments must have had far-reaching consequences for the natural landscape: new settlements and roads were built, previously untilld grounds were taken into cultivation, and existing fields were used more intensively. At the same time, it is important to consider that the opportunities offered by the landscape, determined by factors such as soil quality, water availability and relief, must have imposed limitations to these developments.
2. Long-term developments in the scale and organization of agricultural production. It can be assumed that the processes of urbanization, increasing interconnectivity and increasing social complexity, resulted in changes in consumer-producer relations. By the time southeast Italy was incorporated in the Roman state (around the middle of the 3rd century BC), a relatively highly developed rural economy had come into existence producing wine and olive oil, among other products, on a scale

²⁴ E.g. Castelletti 1972; 1976; 1978, Costantini 1979; 1980; 1983a; 1983b; 1983c; Follieri 1971; 1973; 1975, Follieri and Coccolini 1979, Hjelmqvist 1977, LaCroix Phippen 1975; Pals and Voorrips 1979.

²⁵ Willerding 1971; 1991.

²⁶ E.g. Hillman 1981; 1984, Boardman and Jones 1990, Van Der Veen 2007.

that was large enough to export surplus to other parts of Italy and markets overseas. Clearly, this degree of socio-economic complexity did not develop overnight. However, when do we detect the first indications of an increase in the scale of agricultural production? I will investigate this process focusing on the following key terms:

- a) Agricultural expansion, by which I mean an enlargement of the area that is used for agriculture, but also the increasing investment in the means of production per unit of ground area or, in animal husbandry, per head of livestock;
 - b) Agricultural rationalization, i.e. the introduction of rational, calculated motivations for the organization of land use;
 - c) Agricultural specialization, i.e. the introduction of a production method with which a settlement focuses on the production of a limited scope of agricultural products in order to gain a greater degree of productive efficiency. This is usually done with the aim of selling part of the produce on a market.
3. The effect of Greek colonization on landscape and land use. This is basically a sub-theme of the other two, to which I will pay particular attention. The coastal lands of southern Italy apparently appealed to Greek settlers.²⁷ At a specific point in time, colonial towns developed with strictly organized agricultural territories. What was the basis of subsistence for these towns? What did their agricultural territories look like and how did these *chorai* develop? Although we will see in the following chapters that the traditional perspective on Greek colonization (with an active, ‘civilizing’ role for the colonists) has not escaped criticism, there can be no doubt that the process of defining colonial territories and intensifying agricultural production around the colonial towns affected land use practices elsewhere in southeast Italy. For example, it has often been assumed that Greek migrants introduced grape and olive cultivation in southern Italy.

I . 3 RESEARCH METHOD

Micro level

To carry out this investigation, I discern three levels of interpretation: the micro, meso and macro level. The first one is demonstrated in two case studies, i.e. the plant remains of the sites of l’Amastuola and Muro Tenente (for the location of these sites, see *Fig. 1.1*). These sites were excavated in the 1990s and 2000s by VU University Amsterdam in collaboration with the Soprintendenza per i Beni Archeologici della Puglia. The excavations at l’Amastuola yielded remains of both Greek and indigenous²⁸ occupation, dating to the period between the late 8th and the first half of the 5th centuries BC. The settlement of Muro Tenente was continuously occupied from the 8th until the 1st century BC. These two sites were selected as case studies for the following reasons. Firstly, their occupational history covers most of the first millennium BC, the period under study. More importantly, the sites contain archaeological traces of some of the most important processes of change that characterize the first millennium BC. l’Amastuola has been interpreted as a mixed Greek-indigenous settlement, located outside the territory of the Greek colony of Taras. This makes it an excellent case to investigate the effects of the earliest phase of the Greek colonization and indigenous-Greek relationships. The period represented

²⁷ See Crielaard in press for the attitudes in the Greek epics towards sailing, travelling and other overseas activities.

²⁸ The labels ‘Iapygians’ and ‘Messapians’ for the peoples that inhabited these parts of southern Italy derive from the accounts by ancient Greek authors. For example, the Greek historian Diodorus Siculus (1st century BC) notes

that the oracle of Delphi made the following promise to the Spartan party that was going to settle at Taras in 706 BC: ‘I have given to you Satyrion and Taras, a rich country to dwell in and to be a plague to the Iapyges’ (after Burgers and Crielaard 2007, 79). For a discussion of the ethnic background of these people, see Yntema 2009.

by the excavations at l'Amastuola covers the late 8th until the first half of the 5th century BC. In the subsequent period, Muro Tenente had its most significant phase of growth. In the Early Hellenistic period, the settlement area expanded considerably and isolated farmsteads started to appear in the countryside around the site. These phenomena make the site of Muro Tenente particularly suited to study the processes of rural landscape infill and urbanization that took place in large parts of southeast Italy between the late 4th and 3rd centuries BC.

In the first two chapters of this thesis, I will present the archaeobotanical evidence extracted from the sites of l'Amastuola and Muro Tenente. Combining this information with archaeological and archaeozoological data, I will attempt to shed light on several important aspects of everyday life at these settlements. I will focus on four research aspects in particular, including 1) the use of wood, 2) food preparation and diet, 3) the cultivation of grapes and olives, and 4) the use of plants in ritual activities. The discussion will be structured along these research aspects, which means that I will pay only limited attention to chronological differences.

Meso level

After these two case studies, I will proceed with the interpretation on a meso level. At this stage of interpretation, the case studies will be put in a wider spatial and chronological context. I will discuss the regional landscapes that were exploited by the inhabitants of l'Amastuola and Muro Tenente. Archaeological and archaeobotanical research data will be used to reconstruct agricultural strategies and methods of land use. I will pay special attention to chronological developments in both sites' rural economies and attempt to detect specific differences. In addition, I will focus on the natural landscape around the sites. Where did the inhabitants of l'Amastuola and Muro Tenente go to hunt, collect fire and construction wood, gather wild food and other natural resources? What did the landscapes surrounding these two sites look like?

Macro level (a)

Finally, the analysis will be brought to a macro level, which represents both a regional and a diachronic level of interpretation. In other words, the final purpose of this study is to create an overview of long-term developments in the way land use in southeast Italy developed in the course of the roughly eight centuries under study. This overview will also include research data from the Recent and Final Bronze Age, which are essential to our understanding of the following centuries. The overview will be based on archaeobotanical studies from all sites in southeast Italy inhabited during the first millennium BC for which such studies have been carried out. These results will be integrated into a multidisciplinary framework by including the results of other types of research, including:

1. Archaeological excavation data;
2. Field survey data;
3. Archaeozoological data;
4. Ancient written texts.

Combining these results, I will discuss the same research aspects I focused on in the analysis on a micro level (i.e. the use of wood, food preparation and diet, the cultivation of grapes and olives, and the use of plants in ritual activities).

Macro level (b)

In the second part of the analysis on a macro level, I will integrate the results from the sites in southeast Italy into a diachronic overview of changes in landscape and land use in southeast Italy between ca. 1200 and 200 BC.

I . 4 S T R U C T U R E O F T H E T H E S I S

This study is divided into seven chapters. Chapters 2 and 3 deal with the case studies of l'Amastuola and Muro Tenente, i.e. the interpretation on a micro- or site level. In Chapter 4, the focus will be widened to the meso level, putting the results from the case studies in a broader spatial context. This will result in an analysis of the rural economies and exploitation of the surrounding landscape at l'Amastuola and Muro Tenente. The macro level of research is discussed in Chapters 5 and 6. Chapter 5 includes the archaeobotanical research data from southeast Italy and their interpretation and focuses on the recurring research aspects which include the use of wood, diet and food preparation, the cultivation of grapes and olives, and the use of plants in ritual activities. In Chapter 6, I will review the research conducted on landscape and settlement dynamics in pre-Roman southeast Italy and compose an overview of long-term developments, i.e. the interpretation on a macro level. The last chapter (7) summarizes the results of this study and offers suggestions for further research. Finally, a catalogue of the archaeobotanical research data and a separate appendix with tables and figures is attached.

2. Case study 1: l'Amastuola

2.1 INTRODUCTION: THE SITE AND ITS SURROUNDINGS

The site of l'Amastuola is located on a flat-topped, elongated ridge about 220 meters above sea level (see *Figs. 1.1 and 2.1*). The site derives its name from the *masseria* (landed estate) that occupies the hill-top; the ancient name is unknown. The nearest modern towns are Massafra and Statte, and the site is no more than 15 kilometers away from Taranto, the former Spartan colony of Taras. The l'Amastuola hill offers a good view on the surrounding countryside and of the coastline of the Gulf of Taranto. The slopes are relatively steep, especially on the south and south-west sides of the hill. This steepness makes access rather difficult to the so-called 'south terrace', where the archaeological excavations have taken place. About a kilometer to the south of the l'Amastuola hill, an extensive necropolis is located.

In Ester van Joolen's evaluation of land systems, l'Amastuola is placed in the *Mottola undulating sloping land system*.¹ She describes the area as a landscape of relatively small valleys and hills that are traversed by canyon-like river valleys (*gravine*). One such canyon-like river valley can be found near the site and is aptly named Gravina dell'Amastuola. In the undulating sloping land system, a wide variety of rock formations and sediments occur, that were probably formed by differential erosion. The landscape along the coast is very different from the hilly inland. This strip of land, which Van Joolen named the *Taranto coastal land system*, is characterized by a coastal landscape of mobile dunes, interspersed with lagoons and the occasional steep cliff.² According to Van Joolen, the dunes and the soils in the dry lagoons are not suitable for agriculture because of their high salt and low clay content. However, landscape reconstruction based on lithological and (micro)faunal criteria in the central part of the Taras floodplain by Ruben Lelivelt³ has shown that between the Early Bronze Age and late Roman times the Tarantine coastline consisted of a peatland that was probably periodically flooded. These lagoons may have been used for fishing and gathering of shellfish in the past. Lelivelt also concluded that the salinity levels were low enough to have allowed farming in the marshes.⁴

The *masseria* on the l'Amastuola hill was used in sub-recent times for a mixed farming system with crop cultivation (cereals, fruits and vegetables) and livestock (cows and sheep/goats). In the surrounding countryside, olives, cereals, citrus fruits, watermelons and figs were cultivated. The *masseria* l'Amastuola and its surrounding arable grounds were recently purchased by the Kikau group, a company that produces aluminum window shutters. It aims to create a historical landscape park in the area. As a first step, the olive trees around the l'Amastuola hill have been replaced by an extensive vineyard, and a large number of olive trees was imported from elsewhere to be placed along the roads.⁵

¹ Van Joolen 2003, 55-58, Fig. 3.8.

² Van Joolen 2003, 49-51, Fig. 5.5.

³ Lelivelt 2013.

⁴ Lelivelt 2013, 101.

⁵ www.kikau.it. In the near future, the various buildings of the *masseria* complex are to be restored and used for exhibitions, wine tastings, and a small museum dedicated to the archaeological site will be opened.

2.2 HISTORY OF RESEARCH

The archaeological research at l'Amastuola hill started in 1988, when G.A. Maruggi of the Soprintendenza per i Beni Archeologici della Puglia investigated the above-mentioned necropolis some 800 meters south of the l'Amastuola hill. It is estimated to have contained over 1000 burials, consisting of rectangular cutouts in the limestone rock, of which the vast majority had already been emptied by graverobbers. A total of 154 tombs were excavated by Maruggi, who concluded that the earliest graves are located in the western part of the cemetery area and date to the 2nd quarter of the 7th century BC. Later, the necropolis expanded further to the east; it continued to be used for burials until the early 5th century BC. According to Maruggi, both the grave goods and the burial practices testify to an exclusively Greek milieu.⁶ In 1991, the Soprintendenza started archaeological research on the south terrace of the l'Amastuola hill. The excavations unearthed a series of buildings that yielded evidence of both indigenous and Greek inhabitation. In Maruggi's view, the earliest, indigenous settlement was destroyed in the early 7th century BC and replaced by Greek-style houses of people who used Greek pottery. This suggests that the new inhabitants were Greek colonists, who arrived at l'Amastuola one generation after the foundation of Taras.⁷ This view also ties in with the finds in the necropolis, which appeared to be exclusively Greek.

The fieldwork at l'Amastuola was continued in 2003 by VU University, in collaboration with the Soprintendenza.⁸ Between 2003 and 2008, seven trenches were opened on the south terrace (*Fig. 2.2*), accompanied by field surveys (both on-site and in the surrounding area), non-destructive geophysical surveys, geo-archaeological and archaeobotanical analyses, and further exploration of the necropolis area. Based on these investigations, G.-J. Burgers and J.P. Crielaard reached different conclusions about the settlement on the l'Amastuola hill. In their view, the evidence supplied by domestic architecture, material culture, and burial practices is not indicative of a hostile takeover of the indigenous settlement by Greek colonists. For instance, it was discovered that the indigenous fortification wall was built around 670 BC, which is a few decades later than the date proposed by Maruggi. This late date contrasts with the idea that the indigenous habitation had come to a violent end in the early 7th century BC. Clearly, it would be odd to construct a defense system of indigenous type around a settlement that is part of the territory of a Greek polis. Instead, Burgers and Crielaard argue that during most of the 7th and 6th centuries BC, the south terrace housed a mixed Greek-indigenous community that was orientated towards its (indigenous) neighbors in the west (especially l'Incoronata and Siris) rather than the Greek colony of Taras in the east.⁹ As these authors have shown, the adaption of Greek customs was probably a long-term process at l'Amastuola. Combining the survey data with the excavation results, Burgers and Crielaard proposed as a working hypothesis that the l'Amastuola area was incorporated in the Tarentine *chora* only in the course of the 5th century BC, not in the early 7th century.¹⁰ Around this time, both the settlement on the l'Amastuola hill and the south necropolis were abandoned. At the same time, small rural sites started to appear in the surrounding countryside. This development may be related to the northward and westward expansion of the Tarentine *chora*.

⁶ Maruggi 1996, 201.

⁷ Maruggi 1996, 215–217.

⁸ Preliminary reports: Burgers and Crielaard 2007, Crielaard and Burgers 2012. Final report: Burgers and Crielaard 2011.

⁹ Burgers and Crielaard 2007, 106–107, Crielaard and Burgers 2010, 76. In fact, there is a large volume of published studies describing the extremely complex

and much-debated use of material culture to attribute archaeological evidence to a certain ethnic group. Many scholarly publications have been dedicated to the possible interpretation of 'native' and 'Greek' material culture in southeastern Italy; see, for example, Morel 1984, Whitehouse and Wilkins 1989, Yntema 2000 and Burgers and Crielaard 2007; 2011.

¹⁰ Burgers and Crielaard 2007, 107.

Evaluating the different views on the settlement on the l'Amastuola hill, it is clear that this site is of special interest for the ongoing debate on early Greek migration in southern Italy. As a mixed Greek/indigenous site at a close distance from the colony of Taras, l'Amastuola is an excellent case study to investigate the nature of the relationships between Greeks and indigenous populations. The site also has other attractive features that make it well-suited for this study. As we will see in Chapter 5, archaeobotanical samples from the formative stages of the Greek colonization process are relatively rare. Since the effect of this process on the exploitation and organization of the landscape is one of the main research themes of this study, the archaeobotanical data from l'Amastuola are of crucial importance.

2.3 THE ARCHAEOLOGICAL RESEARCH

Before discussing the results of the archaeobotanical analysis at l'Amastuola, a more detailed introduction to the history of the settlement is required. First, I will present a short diachronic overview of the results of the archaeological investigations. I will then focus on a number of different types of contexts that were either intensively sampled and contained interesting archaeobotanical material, or are of specific interest for the interpretation of the site.

2.3.1 DIACHRONIC OVERVIEW

According to Burgers and Crielaard, the l'Amastuola hill was occupied from the late 8th century onwards.¹¹ The first traces of occupation on the south terrace are represented by the scant remains of three curvilinear huts, the outer *agger* and a second, inner *agger*-type fortification wall, together with impasto and matt-painted pottery, some metal objects and remains of building material. The site has also supplied evidence of cultic activities from this earliest phase, including the remains of a one-time cultic event, probably a ritual feast, and another large deposition of votive material in one of the huts. A third context of ritual origin was found about 15 meters to the southeast of the latter deposition. Here, a large number of votive offerings was found with an exceptionally long chronological range (ca. 400 years), indicating that this location was already in use for cultic activities as early as the first half of the 7th century BC.

Greek influences became increasingly apparent at l'Amastuola during the later 7th and 6th centuries BC. This development is particularly evident in the south necropolis that came into use around 675 BC. Its location, tomb types, manner of deposition and grave inventories are all in line with Greek traditions.¹² In addition, the huts in the settlement were replaced by rectangular, Greek-style houses (*oikoi*). It is clear that this replacement happened gradually and should not be interpreted as a clear break in the site's settlement history, since some of the huts continued to be inhabited when the first rectangular houses were already in use.¹³ Other changes in material culture are also visible in this

¹¹ This diachronic overview is based on the preliminary reports of the investigations at l'Amastuola, i.e. Burgers and Crielaard 2007; 2011, and Crielaard and Burgers 2012.

¹² However, the find of a human-size stele of local stone in the necropolis area strongly suggests that burial traditions were not exclusively of the Greek type. It is distantly related to the well-known Daunian stelai, but has its closest parallels in examples from indigenous sites in Salento,

such as Cavallino, Mesagne and Muro Tenente. For this reason, Burgers and Crielaard (2007, 100 and 106, 2010) have argued that it is at odds in an otherwise Greek-type funerary context, and may be considered an expression not only of ethnic identity but also of gender, status, and elite solidarity with peer groups in indigenous Salento.

¹³ For example, there is a chronological overlap between the hut remains found in Trench 2 and Maruggi's *oikoi* β and γ. Burgers and Crielaard 2007, 106.

period, such as the replacement of impasto and matt-painted wares by pottery of a Greek type. By the end of the 6th century, or perhaps even earlier, Greek-style pottery was indeed produced on site in a potter's workshop. The presence of this workshop, and a smithy producing iron objects, suggests that the settlement belonged to a largely self-sufficient community.

Both the surveys and the excavations indicate that the settlement was largely abandoned before the middle of the 5th century BC. The survey data show that a new settlement was laid out on the lower terraces north and east of the hilltop.¹⁴ This new settlement, which has not been excavated, was apparently much larger than the one of the south terrace. The finds of large, carefully dressed blocks indicates that it was also characterized by a different, more monumental type of architecture. In the same period, the settlement pattern around the l'Amastuola hill changed dramatically. The landscape around the site had been almost void of other settlements in the Archaic and Classical periods, but as the surveys showed, numerous small rural sites started to appear all over a relatively large area covering the terraces below the l'Amastuola hill in the 4th century BC.

Meanwhile, mud slides quickly covered most of the archaeological structures on the south terrace with layers of washed-down earth and debris.¹⁵ However, not all activities on the l'Amastuola hill came to a halt. Cultic activities continued on the same location where the deposition of votive offerings had started in the early 7th century BC. At some point, probably in the 4th century BC, a tomb-like cultic structure made of large, stone blocks was built here (Fig. 2.3) which may have been dedicated to the Dioskouroi (see below, paragraph 2.5.4).¹⁶ Assuming that the l'Amastuola hill had been incorporated into the Tarantine *chora* at this point, Crielaard and Burgers have suggested that the building could have been erected by the Tarentines as a territorial marker.¹⁷ Judging from the latest datable votive material, the cult came to an end in the early 3rd century BC. The cultic structure was destroyed and a large pit was dug to dump the stone blocks. A possible explanation for this course of events may be found in the Roman conquest of southern Italy around this time. The burying of the blocks is then taken to symbolize the clearance of signs of Tarentine domination in the area.

2.3.2 SPECIFIC CONTEXTS

Iron Age huts

The earliest habitation remains on the south terrace consisted of curvilinear huts with stone plinths and possibly wattle-and-daub and/or mudbrick walls, which can be dated to the late 8th and 7th centuries BC. Three such huts were excavated on the south terrace of the l'Amastuola hill; one by the Soprintendenza and two by the VU University team (Figs. 2.6a, 2.7a and 2.9a).¹⁸ The hut in trench 5 (Fig. 2.9a) was about 5 meters long and 3 meters wide, with a stone base that was constructed directly on top of the bedrock. In the northeast corner of the hut in trench 2, many burned high-quality matt-painted pottery sherds were found, along with a few other artefacts that can be associated with wool

¹⁴ Burgers and Crielaard 2007, 92-99.

¹⁵ Mud slides created two distinct layers that are referred to as colluvium 1 and 2. Colluvium 1 was found mainly in trench 2 and was probably deposited in the 6th century BC. It contained pottery and architectural elements such as mudbrick, which were probably washed down from higher grounds towards the top of the hill. Geochemical analyses showed that the upper part of colluvium 1 was rich in phosphates, suggesting that the washed-down earth was manured in later times. Its presence in trench 2

might indicate that the occupation of that part of the terrace had already come to an end by this time. Colluvium 2, on the other hand, can almost certainly be linked to the phase of abandonment of the south terrace in the 5th century BC. Burgers and Crielaard 2007, 101-102.

¹⁶ Crielaard 2011, 88.

¹⁷ Crielaard and Burgers 2012, 87.

¹⁸ Maruggi 1996, 216-217 (Fig. 19), Burgers and Crielaard 2007, 86, Crielaard and Burgers 2012, 71-72.

production, including a spindle whorl, a loom weight and a terracotta ‘spool’ that may have been used for tablet weaving.¹⁹ The combination of these specific artefacts and other objects with burnt organic remains suggest that this was an intentional deposition, possibly of a ritual nature.²⁰ Outside this hut, a thin band of burnt clay was uncovered that may have been associated with an open fireplace or hearth.

In addition, traces of Iron Age occupation were also excavated in trench 3, 4 and 6.²¹ In trench 3, pieces of burnt loam and traces of burning were found, as well as fragments of smashed matt-painted vases (datable mostly to the 7th century BC) and the lower part of a small, undecorated container or storage jar (*Fig. 2.26*) that contained charred botanical material. In trench 6, the possible remains of the cooking facilities of a hut were uncovered (*Fig. 2.10b*). The area was much disturbed and did not reveal any walls from the Early Iron Age phase, but contained many animal bone fragments, a hearth, an oven and a few other fireplaces that were probably used for low-temperature cooking. A layer (unit 620) that was possibly connected to the same ‘hut’, but may also represent another domestic context from the Early Iron Age phase, is situated to its southwest. Here, traces of burning were found, as well as a spindle whorl, an iron nail, some loomweights and much pottery, mostly matt-painted and impasto wares. Finally, some probable remains of walls or roofs were found in trench 4, in the leveling material that was used to prepare the area for later construction activities.²² They consisted of lumps of burnt loam with impressions of branches or stalks (*Fig. 2.4*). The imprints seemed to belong to both smaller plants or trees and larger branches, but were generally too large in diameter (between 3 and 4 centimeters) to have been made by reed.²³

The ritual deposition in trench 6

In the north-east part of trench 6, a circular feature of hard-packed clay (unit 509) was uncovered (*Fig. 2.10a*). Underneath this layer, a black semicircular area was found that had a hard whitish band around it (units 501 and 510, *Fig. 2.11*). This feature contained a huge amount of pottery, both burned and unburned sherds, sometimes belonging to the same pots, of a variety of shapes that can mostly be related to the communal consumption of food and wine.²⁴ As a possible interpretation, Crielaard has suggested that after the ritual consumption of food and drink, the vases were smashed and the fragments left in the ashes.²⁵ The black area also contained much charcoal and several domestic objects, including a grinding stone and terracotta loomweights, ‘spools’, a marble, a spindle whorl and a conical object of unknown function. The evidence suggests that the ritual might have been a one-time event. Since the pottery comprised especially Sub-Geometric finewares (with a minority of coarse wares and

¹⁹ Crielaard 2011, 50. As explained by Gleba (2008, 103–104; 127–128; 140–143), these three types of objects represent different stages in the process of textile production. A spindle whorl is positioned on a spindle and provides weight and tension for spinning fibres into thread. Loom weights keep the warp of a warp-weighted loom taut during weaving. Spools (Italian ‘rocchetti’) are small cylindrical objects, made of terracotta and ranging in length between 3 and 10 cm. Although their function is still widely debated, most scholars agree that they are in some way associated with textile production. Ræder Knudsen (2002, 228–229) and Gleba (2008, 141) have argued that they performed a similar function as loom weights on a standing loom. Spools, however, may have been used as small weights for the sets of threads passing through tablets representing a different weaving method,

so-called tablet weaving.

²⁰ Burgers and Crielaard 2007, 86.

²¹ Burgers and Crielaard 2007, 89, Crielaard and Burgers 2012, 70–71 and 89–90.

²² Burgers and Crielaard 2007, 89.

²³ Research of reed varieties from all over the world that was carried out by Laura Kooistra (pers. comm.) has shown that reed stalks rarely grow thicker than 2 or 3 centimeters. This seems to be confirmed by the descriptions of the Gramineae, Cyperaceae and Typhaceae families in Tutin *et al.* 1980, 118–267 and 275–323.

²⁴ Preliminary results pottery analyses: Crielaard and Burgers 2010, Crielaard 2011, 69–75, Figs. 3–33, 3–34, 3–35, 3–36, 3–37, Tabella 2.

²⁵ Crielaard 2011, 72–73.

handmade wares, including matt-painted), this event is likely to have taken place in the first half of the 7th century BC. This means that it can be related to an early stage in the settlement's occupation history, probably not long after Greeks had settled at l'Amastuola.²⁶

Greek-style buildings/ oikoi

The first three Greek-style structures, building α and *oikoi* β and γ , were excavated by the Soprintendenza in the 1990s (Fig. 2.7a).²⁷ The VU excavations also unearthed several rectangular, one-room houses, *oikoi* ϵ and η and buildings δ , ζ and θ (Figs. 2.8a and 2.9a).²⁸ VU-trench 3 was located directly north of *oikos* γ ; in this area, a much-disturbed terrace wall was found that seemed to be a continuation of the north-west wall of *oikos* γ (Fig. 2.5a).²⁹ In niches in the southeastern face of this wall, the remains of two or three small (bread?) ovens were discovered. The pottery associated with these ovens was mainly of Greek colonial type. This trench also contained a pavement of large flagstones, already partly uncovered by the Soprintendenza, which was probably in use until the late 6th century BC.

This occupation period, between the late 7th and late 6th centuries BC, seems to be roughly the same for all the Greek-style buildings on the south terrace. Building δ was uncovered in the western part of the trench 4 (Fig. 2.9a).³⁰ It had a tile roof and a floor of beaten earth mixed with lime. Inside the room, a hearth, a stone mortar and fragments of a storage vessel and the upper parts of water containers (hydriae) were found. These hydriae were dug into the floor and could have been used as pot stands. Considering its inventory and the fact that it seems too small (2.9 x 4.8 m) to be an independent house, building δ was interpreted as a kitchen facility. It may have been part of a larger building complex, possibly a courtyard house. South-east of this building, the foundations of *oikos* ϵ were unearthed. As I mentioned above, this structure seems to have housed a smithy. It consisted of a stone-paved antechamber and an inner room that contained both objects for domestic use (such as spindle whorls and a grinding stone) and various iron objects. The oven that might have been used to heat the metal was situated in the northern part of the room. To the southeast of this oven a stone workbench was discovered. Small pieces of metal bloom were found scattered outside the building.

Three other rectangular structures, buildings ζ , θ and η , were uncovered in trench 5 (Fig. 2.9a).³¹ All three buildings were probably covered with roof tiles. Building ζ was constructed on top of the Iron Age hut in this trench, partly re-using the hut's foundation stones. Associated pottery from this structure comprised 'colonial' finewares, impasto, a Corinthian type-A transport amphora and storage jars. Inside this structure, a burned layer was uncovered that may have been associated with a pyrotechnic feature, probably an open fireplace. Building θ was built against the south side of ζ somewhere in the later 7th century BC. The floor matrix provided an interesting array of finds, including carbonized plant remains, burnt loam, a trapezoidal and a rounded cone-shaped spindle whorl, a loom weight, a bronze arrow head and an iron double axe. A piece of antler and bones of red deer (*Cervus elaphus*) were found inside and just outside this building.

Oikos η was located to the southeast of buildings ζ and θ . Only the western wall and part of what seems to be a portico and entrance on the south side were excavated. The pottery finds from the floor levels (coarse cooking ware, 'colonial' wares, hydriai, a Corinthian type-A transport amphora and pithoi, but no matt-painted ceramics) indicate that it was slightly later in date than the other two buildings, ζ and θ . The *oikos* complex was completed by an outside area between buildings θ and η . Here, two circular stone platforms were located that have been interpreted as silos for grain storage

²⁶ Crielaard 2011, 73.

²⁷ Maruggi 1996, 203-214.

²⁸ Burgers and Crielaard 2007, 89-92, Crielaard and Burgers 2012, 70-90.

²⁹ Burgers and Crielaard 2007, 87-89.

³⁰ Burgers and Crielaard 2007, 89-90, Crielaard 2011, 57-59.

³¹ Burgers and Crielaard 2007, 90-91, Crielaard 2011, 62-67.

(Fig. 2.12).³² Both platforms had a diameter of almost two meters and were constructed of mainly small stones, delineated by a ring of medium-sized stones, some of which were found standing in a vertical position, suggesting that the platforms supported some kind of superstructure. Bands of yellowish soil, that can probably also be connected to this superstructure, were found surrounding each of the platforms. Unfortunately, the structures contained very little datable material and no botanical macroremains, but the find of a hydria handle from the yellowish soil suggests that the platforms were in use in the same period as buildings θ and ζ .

Potter's workshop

The workshop that was uncovered in trench 6 belongs to the same phase as the *oikoi* in the occupational history of the south terrace. It appears to have been in use between the late 7th and the early 5th century BC (Fig. 2.10a).³³ The workshop contained two levigation tanks and at least three kilns, a large one in the south-east part (kiln D) and two smaller (kiln C and E) on the other side. However, during the excavations in 2007 it became clear that not all kilns were in use at the same time and that the workshop was modified and restructured during at least three building phases. Phase 1 is represented by a floor constructed with the help of large flagstones, kiln D and possibly also kiln E. In phase 2, a courtyard wall was constructed, running north-west/south-east and delineating the workshop in the east. In the south-east and south, the stone levigation tank and two rounded basins were placed. Kiln C was also in use in phase 2. Phase 3 belongs to the youngest habitation phases on the south terrace, and can be placed in the first half of the 5th century BC. In this period, the working area was leveled with a new, thick floor (unit 313) that contained a hearth and several objects that can be associated with a typical domestic context, such as loomweights, kitchenware, an iron object that was interpreted as a roasting spit (*obelos*), and a cooking pot with the carbonized remains of a sort of gruel (see below).

To the northwest of the workshop structure, a half-open space was excavated that probably had a domestic function.³⁴ The structure contained a succession of floors or surfaces, mainly dating to the 6th century BC, with numerous domestic objects such as grinding stones, a pounder, a whetstone and loomweights. One of the lower surfaces included two cooking areas that consisted of a hearth or fireplace (unit 538), and another fireplace on top of a flat stone (unit 540), probably for high-temperature cooking. To the east of this walled space, the remains of another pottery kiln (unit 537) were uncovered. All in all, it seems that the potter's workshop was part of a larger area devoted to ceramic production.

2.4 THE ARCHAEOBOTANICAL RESEARCH³⁵

2.4.1 SAMPLING METHODS AND DATA

Archaeobotanical sampling took place in a more or less systematic way from the first VU excavation campaign onwards. Soil samples were taken from all the excavated trenches, i.e. from five units in trench 1, 24 in trench 2, six in trench 3, 20 in trench 4, 29 in trench 5, 38 in trench 6 and two in trench 7. A detailed description of the sample processing method, the complete results of the archaeobotanical analyses, and the locations of the sampled units can be found in Appendices 1 and 2 and Figs. 2.5b-10b, respectively. The archaeobotanical sample yielded a total of 3.114 charcoal fragments and 8.947 seeds

³² This interpretation is based on parallels with similar structures from Greece and western Anatolia which were also interpreted as silos. For a detailed discussion, see BOX 2.

³³ Crielaard 2011, 75–76.

³⁴ Crielaard 2011, 77.

³⁵ The archaeobotanical finds from l'Amastuola have already partly been published in Lentjes 2011.

and fruits, most of them carbonized. The results of the charcoal analysis are visualized in *Figs. 2.13 and 2.14*, the seeds and fruits in *Fig. 2.15 and 2.16*. In these figures, no chronological or contextual differences are distinguished. The archaeobotanical data from l'Amastuola will now be discussed by theme, and not necessarily chronologically.

2.4.2 CHARCOAL

Charcoal is what is left of wood after it carbonizes, i.e. when it is heated in the (near) absence of oxygen. The black residue consists of impure carbon, which is not effected by bacteria or fungi. The charcoal assemblage from l'Amastuola includes thirteen different wood species.³⁶ It is logical to think of archaeological charcoal as the remains of firewood, but not all trees provide suitable fuel. In fact, certain species are traditionally used as firewood, whereas others are of much better use for construction, to produce small wooden objects, or as decoration. In the following, the different wood species that were found at l'Amastuola will be separately discussed, focusing on their characteristics and practical use.

Figure 2.13 and 2.14 make it clear that the great majority of charcoal fragments, both in absolute numbers (1.084 fragments) and in terms of frequency (in 85 units) belong to various oak species, both evergreen (*Quercus* cf. *ilex*) and deciduous types. There are more than ten different oak species that grow in Apulia today, including Macedonian oak (*Quercus trojana*), Turkey oak (*Quercus cerris*) and Vallonea oak (*Quercus macrolepis*).³⁷ Olive wood (*Olea europaea*) occurs only slightly less frequently at l'Amastuola, in 81 units, and its 1.008 fragments make up 39% of the total amount of identified charcoal pieces. Olive trees can reach hundreds of years of age and tend to become hollow and dead on the inside, and split into multiple smaller trunks on the outside. This typical form makes the wood less suitable for use as construction material.³⁸

Today, wild olive trees (*Olea europaea* ssp. *sylvestris*) and evergreen oaks can mostly be found in Mediterranean *macchia*. *Macchia* is essentially a type of shrubland that is characteristic of the Mediterranean region, typically consisting of densely growing evergreen shrubs.³⁹ Although *macchia* is by definition a natural vegetation type, its appearance is in many places due to destruction of forest cover, mainly by frequent burning that prevents young trees from maturing. It tends otherwise to grow in arid, rocky areas where only drought-resistant plants are likely to prosper. In most cases, Mediterranean *macchia* is the result of human impact on the landscape. I will discuss this vegetation type and other characteristics of Mediterranean ecosystems in more detail in Chapter 4 (BOX 1).

The other charcoal species, which make up significantly less dominant parts of the charcoal assemblage, include *Rhamnus/Phillyrea* (5.2%), *Arbutus unedo* (4.8%), *Juniperus* sp. (2.3%), *Erica* sp. (1.6%) and *Pistacia* sp. (1.15%). The wood anatomy of the genera *Rhamnus* and *Phillyrea* is almost indistinguishable, but both include common *macchia* species such as Italian buckthorn (*Rhamnus alaternus*) and mock privet (*Phillyrea angustifolia*). Italian buckthorn wood is suitable for the turned components of furniture, but starts to release a foul smell when it is worked (*legno puzzo* or 'stinking wood'). The leaves and berries can be used as a natural dye: the leaves and branches provide yellow, the fruits green. The strawberry tree (*Arbutus unedo*) is an evergreen shrub or small tree that is characteristic of *macchia* vegetation in the Mediterranean region.⁴⁰ The fruit, a small pinkish-red berry, is edible. In some coun-

³⁶ Unless indicated otherwise, all botanical characteristics from the plant species that are discussed in this chapter were taken from Pignatti 1982 and Minelli 2002.

³⁷ Pignatti 1982, 113–120. One gigantic Vallonea oak that is at least 600 years old can be admired at Tricase. rural-

journey.com/italy_travelguide/Puglia/Quercia-Vallonea.

³⁸ Gale and Cutler 2000, 171.

³⁹ Smith and Gillett 2000, 6.

⁴⁰ Pignatti 1982, 261, Renfrew 1973, 152.

tries arbutus berries are used to make jam and liqueurs (Portuguese ‘medronho’, Corsican ‘liqueur a l’arbose’, Sardinian ‘fior di corbezzolo’). The charcoal fragments of juniper (*Juniperus* sp.) may belong to common juniper (*Juniperus communis*), prickly juniper (*Juniperus oxycedrus*) or Phoenician juniper (*Juniperus phoenicea*). The latter two grow on dry soils and in *macchie*; common juniper can be found throughout the northern hemisphere in heath lands and arid forests. Tree heath (*Erica arborea*) reaches a typical height of 1 to 4 meters and has white flowers; Mediterranean heath (*Erica multiflora*) becomes 50–180 centimeters tall and its flowers are pink. Both species prefer acid soil and are found mostly in the *macchia*, the dry evergreen shrublands that can be found all around the Mediterranean region (see the discussion of *macchia* in BOX 1). Until recently, tree heath was often used for charcoal production, to make brooms and to cover the roofs and walls of houses.⁴¹ The charcoal fragments of *Pistacia* may belong to either *Pistacia lentiscus* or *Pistacia terebinthus* (which is not the pistachio tree that is now widely cultivated in the Mediterranean region for its edible nuts, *Pistacia vera*). *Pistacia terebinthus*, terebinth, can be tapped for turpentine. Terebinth resin was widely used as a preservative in ancient wine because it has the ability to kill bacteria. *Pistacia lentiscus* supplies mastic resin.⁴² Mastic trees are a typical part of middle/high Mediterranean *macchia*, especially along the coasts. The wood is hard and robust but not very usable as timber because mastic trees are often a bit crooked and rarely grow higher than 5 meters. It is, however, excellent wood for charcoal production.

Finally, a small number of fragments belonging to the Rosaceae or Maloideae family (including the genera *Prunus* and *Sorbus*) and myrtle (*Myrtus communis*) were found, in addition to pine tree (*Pinus*) and rosemary (*Rosmarinus officinalis*). *Prunus* is a genus of trees and shrubs that includes plums (*Prunus domestica*), cherries (*Prunus avium*), peaches (*Prunus persica*), apricots (*Prunus armeniaca*) and almonds (*Prunus dulcis*; synonym: *Amygdalus communis*). But the charcoal from l’Amastuola is more likely to belong to a wild species, as most of these varieties were not introduced in Italy before Roman times. The genus *Sorbus* also includes several hundred species of trees and shrubs (in the subfamily Maloideae of the Rosaceae family), such as whitebeam (*Sorbus aria*) and rowan (*Sorbus aucuparia*).

Myrtle is an evergreen shrub or small tree that can become up to 5 meters tall. Myrtle is widespread in the Mediterranean region and is one of the most common components of Mediterranean *macchia*. The leaves and berries contain a fragrant oil that is still used in modern Sardinia and Corsica to produce an aromatic liqueur called ‘mirto’. The fragments of pine wood could not be identified on the species level, but probably belong to either umbrella pine (*Pinus pinea*) or Aleppo pine (*Pinus halepensis*), since these are the two most common species in this part of Italy. Both these pines can become quite tall, up to 25 meters, and are most commonly found along the coast, in pine bushes (*pinete*), *garighe* (see Chapter 4), in *macchia* and on arid slopes. The cones of the umbrella pine contain edible seeds (pine nuts). Much like *Erica*, pine trees are very flammable but well-adapted to fire. The trees die, but grow back very swiftly from the popped seeds released from their cones.⁴³

⁴¹ Gaudenzio and Peccenini 2002,36.

⁴² Tree resin can prevent wine from turning into vinegar, and is still used for this purpose in Greek resinated wine, *retsina*. In ancient Rome, myrrh, frankincense, pine and cedar resin were the preferred wine additives. But since myrrh and other exotic tree resins were not widely available in Italy, the Romans –and presumably also other ancient peoples that had no access to the major trade routes from Africa and the Arabian peninsula– often had to be content with terebinth tree resin. The terebinth tree

(*Pistacia terebinthus*) and mastic (*Pistacia lentiscus*) can yield up to 2 kilograms of resin in late summer or fall, at just about the same time that grapes are ready to be picked. Today, terebinth resin is still used to make chewing gum, perfume, drinks and sweets in the Near and Middle East. Although the word turpentine actually derives from terebinth, the natural resin, unlike the concentrated distillate, is not offensive in taste and smell. McGovern 2003, 70–71.

⁴³ Grove and Rackham 2001, 219–220.

Rosemary is a woody perennial herb that is best known for its fragrant evergreen needle-like leaves that are used frequently in traditional Mediterranean cuisine. Being quite resistant and drought-tolerant, rosemary is often part of low Mediterranean *macchie* and *garighe*.

2.4.3 SEEDS AND FRUITS

The samples mainly included cereals, the great majority of them being hulled barley (*Hordeum vulgare*).⁴⁴ Emmer wheat (*Triticum dicoccum*) is somewhat less common, but did provide a few spikelet forks (or rachis internodes, the stem portion between the nodes). In contrast to the cereal finds from Muro Tenente (see Chapter 3), free-threshing wheat (*Triticum aestivum/compactum*) is quite rare at l'Amastuola, and naked barley was not found at all. The samples also contained quite a few charred seeds of weeds that might have grown in the cereal fields: oat (*Avena*), brome (*Bromus* sp.), rye (*Secale cereale*), autumn adonis (*Adonis* cf. *annua*), ryegrass (*Lolium* cf. *perenne/rigidum*), mallow (*Malva* sp.), a few seeds from the Spurge family (Euphorbiaceae), héliotrope (*Heliotropium* sp.) and bur medick (*Medicago hispida*). Apart from the charred weeds, the soil samples also contained a number of 'fresh' (i.e., not carbonized) seeds that were probably modern contaminations.⁴⁵ Because of their questionable provenance, these seeds have been left out of the graphics. Fruit remains are very rare: only a few olive stones, three grape pips (*Vitis vinifera*) and a mastic berry (*Pistacia lentiscus*) were found. Pulses, on the other hand, abound: lentils (*Lens culinaris*) and broad beans (*Vicia faba* var. *minor*) are both part of the archaeobotanical assemblage, but the most dominant legume species is bitter vetch (*Vicia ervilia*). Finally, a most unusual find was made in the ritual deposition in trench 6; the burnt remains contained carbonized garlic cloves (*Allium sativum*).

2.5 THE ARCHAEOBOTANICAL RESEARCH: INTERPRETATIONS

In the following paragraph, I will discuss the archaeobotanical data from l'Amastuola and the information they provide about a number of research aspects. I will start by reviewing the evidence of local plant use, discussing the use of wood. Subsequently, the information about food preparation and diet, the cultivation of grapes and olives, and the use of plants in ritual activities will be reviewed.

⁴⁴ At least one sample, from unit 534, contained both six-rowed barley (*Hordeum vulgare* L. ssp. *vulgare*) and two-rowed barley (*Hordeum vulgare* L. ssp. *distichum*). According to Jacomet (2006) and Bouby (2001), six-rowed barley has three fertile spikelets per rachis segment, whereas two-rowed barley has only one (the two outer ones are sterile). However, this distinction is very difficult to make with charred cereal remains, since the process of carbonization often causes the grains to become corroded or pressed, and therefore deformed (see most recently

Ruas and Bouby 2010, with further references). For these reasons, it was decided to refer to the barley grains from l'Amastuola and Muro Tenente as *Hordeum vulgare*.

⁴⁵ Among these not-carbonized seeds were field mustard (*Brassica rapa*), coastal sandbur (*Cenchrus pauciflorus*), goosefoot (*Chenopodium* sp.), spiny spiderflower (*Cleome spinosa*), hawthorne (*Crataegus* sp.), viper's bugloss (*Echium* sp.), sun spurge (*Euphorbia helioscopia*) and small burnet (*Sanguisorba minor*).

In *Table 2.1* and *Figure 2.17*, the charcoal from fourteen contexts associated with fuel are compared, including hearths and fireplaces, namely the area outside the Iron Age hut in trench 2, the interior of buildings ζ and δ, one of the (bread?) ovens in *oikos* γ, and the various kilns that were excavated in and around the potter's workshop in trench 6. The locations are indicated in *Fig. 2.18*. Obviously, these charcoal assemblages only provide a partial impression of which species were preferred as fuel. In addition, the archaeological contexts from which they were collected represent different types of pyrotechnic structures, including closed ones such as ovens and furnaces, as well as open fireplaces. There is a large number of publications considering the different types of fuel that can be used in structures of these types.⁴⁶ Charcoal can be the residue of heating or cooking fires, but it can also be produced to use as a fuel to generate higher temperatures, particularly for industrial processes such as metallurgy and pottery production. Determining the purpose of charcoal assemblages from archaeological contexts can be particularly difficult.⁴⁷ The interpretation often depends on clues provided by the context, although recent research has highlighted the use of physical and chemical characteristics of charcoal to provide information about the nature of the fuel and the temperatures that are generated during combustion.⁴⁸ However, this type of analysis has not been carried out at l'Amastuola. Moreover, the archaeological context of most of the charcoal finds often provided only limited information about its use. Therefore, the following overview of fuel use at l'Amastuola concerns only the wood types and possible differences of wood use between different pyrotechnic structures.

More than two thirds of the charcoal collection consists of olive wood (31%) and oak wood (mostly deciduous, but also a small part evergreen oak, 39%). This outcome is not surprising, since olive and oak trees are generally much bigger than the other species that occurred in these samples, which included *Erica* sp. (8%), *Rhamnus/Phillyrea* (3%), juniper (2%), *Pistacia* sp. (0.75%) and strawberry tree (0.5%). In comparison to these middle-high *macchia* species, oak and olive trees are more likely to provide large quantities of firewood.⁴⁹ Moreover, oak and olive also provide suitable fuel. They are still often used in hearths, ovens and stoves in southern Italy today. Both species have high calorific values and provide long-lasting fuel,⁵⁰ which would have been particularly needed in the pottery and metal kilns at l'Amastuola. Indeed, the metal oven (units 166 and 170) in trench 4 contains mostly olive and oak wood, with a few fragments of juniper. Unfortunately, only a limited amount of charcoal was found in and around the oven (16 fragments). The same applies to the sample from kiln D (unit 346), which contained one single fragment of olive wood and three of *Rhamnus/Phillyrea*. The kiln that was found northeast of the potter's workshop (unit 537, 542) provided a richer charcoal sample, which mostly contained oak (75%) and olive wood (17%) with a little *Rhamnus/Phillyrea* (1.5%). Kiln E (units 335, 373 and 332) yielded a sample in which a relatively wide variety of species are represented, with strawberry tree (1%), juniper (3%), *Pistacia* (3%) and *Rhamnus/Phillyrea* (9%) in addition to the 'usual' olive wood (38%) and oak (32%).

It may be questioned whether this material represents the residues of heating or cooking fires or of fuel that was carbonized before (industrial) use. Charcoal is still used in a range of industrial processes as a heat source, both on a small and a large scale.⁵¹ Charcoal would have been the preferred type of fuel instead of wood in the pottery and metal workshops in trenches 6 and 4, since it can reach much higher temperatures. Charcoal is produced in so-called charcoal burners, in which wood is carbonized in a reducing atmosphere (i.e. with as little oxygen as possible) to prevent it from burning and

⁴⁶ See especially Vernet 1997, Théry-Parisot 2001, Dabas *et al.* 2002, Thiébaud 2002, Fiorentino and Magri 2008, Keeley 2009, Scott and Damblon 2010.

⁴⁷ Scott and Damblon 2010, 3.

⁴⁸ McParland *et al.* 2009a; b.

⁴⁹ Chabal 1994, 323–324.

⁵⁰ Gale and Cutler 2000, 173 and 205.

⁵¹ Syred and Griffiths 2006.

turning to ashes. In this way, the wood becomes completely dry and compact, greatly increasing its heating value and limiting the production of smoke.⁵² There are no archaeological indications of the use of charcoal burners at l'Amastuola, but such structures can be archaeologically invisible.⁵³ In modern northern Africa, for instance, charcoal is produced in a shallow pit with a leveled base. The wood is laid out in a neat stack inside the pit, then covered with vegetation or straw and loose earth before it is ignited. This earth cover is kept wet during the burning process, which can take ten to fifteen days.⁵⁴ After the charcoal is collected and taken elsewhere, it is unlikely for the remaining structure to survive in the archaeological record. Even if it did, a charcoal burner is unlikely to be located inside the settlement, as the smoke would cause nuisance and even fire hazard. This means that it would not be picked up by urban-based excavations.

There is little more clarity about the use of wood as construction material.⁵⁵ The lumps of burnt loam with impressions of branches that were found in trench 4 show that vital parts of the Iron Age huts or houses were made of wood. The stalks were probably part of the wattle-and-daub walls or roof. Unfortunately, it is unclear to what kind of wood the impressions belong. A varied charcoal assemblage was found in the same context (unit 122), including *Erica*, juniper, olive, mastic, *Phillyrea*, oak (deciduous and evergreen) and fruit trees, which makes it all the more likely that the area was used to dump refuse of all sorts and does not exclusively contain building material. There are some other contexts that might contain traces of building wood, such as the leveling layer that was deposited on top of the Iron Age hut in trench 2 (that included olive, oak and juniper wood), but the quantities are too small and their provenance too questionable to reach any valid conclusions about construction wood at l'Amastuola.

2.5.2 FOOD PREPARATION AND DIET

The analysis results of all the seeds and fruits that were found at l'Amastuola can be found in *Figs. 2.15* and *2.16* and Appendix 2. It can be concluded that a considerable part of everyday meals probably consisted of cereals. They could have been consumed in various ways, in the form of watery gruels (see below), or milled to produce flour to make bread. A series of three small ovens, dating to the 6th century BC, was found in niches in the south face of the much disturbed 'terrace wall' in trench 3. This wall is a continuation of the north-west wall of *oikos* γ. The size and location of the ovens suggest that they were used in connection with food preparation, possibly bread baking. Unfortunately, no direct archaeobotanical evidence for the processing of cereals was found here. The sample that was taken from one of the ovens (unit 112) did not include any macroremains, nor did the archaeological contexts around them, with the exception of unit 105, which represents an ancient outdoor surface to the south and east of the ovens. A single barley grain and one of emmer were found here. In Table 2.2, the data from another possible oven are added. This one was set against the exterior wall of building δ (unit 148) and will therefore be referred to as oven δ. This oven also contained no more than a single grain of emmer. However, the ashy refuse dump next to it (unit 144⁵⁶) is especially rich in macroremains, including 122 carbonized grains of hulled barley, 24 of emmer wheat and 39 other unidentified cereal grains. Considering the location and the pottery finds from this dump (including

⁵² Horne 1982, 6.

⁵³ For the use of charcoal as fuel in archaeological contexts, see paragraph 5.3.1, as well as discussions in Théry-Parisot 2001, Pye and Ancel 2006, Braadbaart and Poole 2008.

⁵⁴ Kelley 2002, 4.

⁵⁵ The volume of published studies describing the role of wood in construction in pre-Roman Italy is remarkably small, but some relevant information can be found in Richter 1966, Meiggs 1982 and most recently Gale and Cutler 2000.

⁵⁶ Burgers and Crielaard 2007, 89.

some 7th century BC pottery), it can be hypothesized that it was used to deposit burnt refuse from the oven, such as cereals that had accidentally been carbonized during processing.

It appears that most of the cereals that were found at l'Amastuola were hulled, although it should be added that naked cereals are often under-represented in archaeobotanical assemblages.⁵⁷ In any case, cereal parching must have been a common part of everyday food preparation.⁵⁸ Parching was probably done using mortars and pestles.⁵⁹ Two such mortars were found during the excavations, in building δ (Fig. 2.20), and in one of the colluvium layers that covered the Iron Age hut in trench 2 (Fig. 2.21). The excavations also uncovered several grinding stones, for example in *oikos* ϵ (Fig. 2.22). Figurative evidence for the use of mortars and pestles can be seen on the Daunian stelai depicted in Fig. 2.23.⁶⁰ Furthermore, Hesiod (ca. 750–650 BC) describes the manufacture of a wooden mortar of considerable dimensions (ca. 90–100 cm in height) in *Works and Days*.⁶¹ Interestingly, a stone mortar of a similar size was found on the slope of the l'Amastuola hill (Fig. 2.24a). However, since this tool was found out of context, it is unclear whether it derived from the ancient settlement; in fact, it may have been used at the *masseria* l'Amastuola on the hilltop. Mortars of this type were still in use until the middle of the 20th century in this part of Italy (Fig. 2.24b).

Weeds make up a significant part of the macroremains assemblage at l'Amastuola, and include species that grow in cornfields (*Avena* sp., *Bromus* sp., *Secale cereale*, *Adonis* cf. *annua*) and other cultivated grounds (*Malva* sp., *Heliotropium* sp., *Medicago hispida*), including waste places and waysides.⁶² In contrast, chaff remains are scarce at l'Amastuola. Only two rachis internodes were found, both of them among the remains of Iron Age habitation in trench 6.

Given the abundance of cereal weeds, the scarcity of chaff remains is striking. Three possible explanations can be proposed to explain this contrast. The first one is connected to a general problem with the interpretation of carbonized plant assemblages. As Hillman⁶³ has pointed out, the only components that are likely to survive in charred form are the small, dense items able to drop quickly through the flames and into the ashes without being burned themselves. Light chaff remains such as straw and rachis fragments are the first components to be lost.⁶⁴ Apart from this first explanation, the mesh width of the smallest sieve in the flotation machines that were used at l'Amastuola may have also influenced the find. The largest sieve had meshes of 2.5 and the smallest of 1 millimeter, which is a good measure for the gathering of charcoal fragments, but too large for most chaff remains and small weed seeds. Never-

⁵⁷ Hulled cereals often require a process of parching before they can be completely threshed and processed, and there is a good chance that they accidentally carbonize in a fire. These carbonized hulled cereals often represent a large part of the macroremains assemblage from Mediterranean countries, because other environmental factors that allow preservation, such as permanent wetness or drought, are usually lacking. Therefore, species that are less likely to be carbonized, either because they do not require such a preparation process (vegetables, fruits) or because they are destroyed by the fire (oily seeds such as flax), will probably be under-represented among the macroremains. Cf. Hillman 1981, 142, Jacomet 2006, 5, Van Der Veen 2007, 977.

⁵⁸ We know from ethnographic evidence that hulled wheats are usually stored as spikelets and dehusked when required, which was likely to be a time-consuming daily chore. Hillman 1984, 8.

⁵⁹ For a discussion of the efficiency of mortars for grain dehusking in comparison with a saddle-quern, see Meurers-Balke and Lüning 1992, 346–357.

⁶⁰ Nava 1980, fig. CCLVII and CCCLXXXI. Numerous examples of this type of stelai are known from northern Apulia, where they came to light during plough activities in the arable fields near the modern town of Manfredonia. Since they were obviously found out of context, it is difficult to associate them with a precise chronological period. However, according to D. Yntema the figurative style on the stelai that are mentioned in this chapter suggests a date between ca. 650 and 580 BC.

⁶¹ *W&D* 420.

⁶² Polunin 1969.

⁶³ Hillman 1981, 140.

⁶⁴ Cf. Boardman and Jones 1990.

theless, it can be argued that spikelet forks were apparently big enough to be collected in the small sieve, and they do not abound in the archaeobotanical assemblage either. A third explanation, then, is that the waste products from cereal cleaning are only rarely found in soil samples from l'Amastuola because this process usually took place outside the settlement.⁶⁵ The finds of mortars and grinding stones indicate that cereals were probably cleaned at the household level, but these tools might have been used for the last cleaning stage only. The cereal weeds that were found at this site all have roughly the same grain size as wheat and barley. It is possible that they were already partially cleaned, and mixed with the odd weed grain that had escaped the cleaning process of sieving. Such sieving processes only remove weeds that are smaller than the cereal grains.⁶⁶ Apparently, the remaining weeds did not bother the inhabitants of l'Amastuola, as they did not remove them when they used cereals to prepare their meals. We have direct evidence of this in the form of a cooking pot with carbonized contents. This pot, with a rounded base and a relatively narrow neck, was found on the most recent floor level in the potter's workshop (unit 313, Fig. 2.25). It contained ten fragments of charred olive stones along with 170 seeds of hulled barley, emmer wheat, pulses (*Vicia* sp.), grains of wild grass (*Bromus* sp.) and free-threshing wheat in what seems to be a sort of gruel (see Table 2.3).

Another interesting find for our understanding of the inhabitants' diet was made in a storage jar (unit 107 lot 275) from the partially burned layer northwest of the 'terrace wall' in trench 3 (Fig. 2.26, Table 2.3). This jar is datable to the middle of the 7th century BC, and contained 685 seeds of bitter vetch, but no other crop remains. As its name implies, the seeds of bitter vetch are bitter and toxic to humans and to some animals. The poisonous substance can, however, be removed by soaking the seeds in water.⁶⁷ The discovery of the storage jar full of seeds next to fine matt-painted pots used for household purposes seems to indicate that this vetch was actually used for human consumption here. Bitter vetch is omnipresent in all chronological phases at l'Amastuola, indicating that they remained an important part of the diet throughout the settlement's occupation period. On the whole, pulses seem to have been the predominant crops beside cereals. Beside bitter vetch, lentils and broad beans occur frequently in the samples. Broad beans were found in all habitation phases.⁶⁸ Lentils only occurred in the samples that were datable to the 6th century BC, but that could be coincidental. It is possible that the lentil was not much in use in the earliest phases, but it seems unlikely that it was part of the human diet in the 6th century and stopped to be consumed in the 5th century BC. The absence of chickpeas (*Cicer arietinum*) in the samples from l'Amastuola is remarkable (see paragraph 5.3.2 on the occurrence of these species at other contemporary sites in southeast Italy), but probably purely coincidental. Pulses are notoriously underrepresented in archaeological soil samples, as they are less likely to get into contact with fire and therefore have less chance to get carbonized.⁶⁹

The location of the above storage jar and others that were found within the settlement suggests that crop storage took place mostly at the household level at l'Amastuola. Storage vessels and amphorae were found in various other contexts, such as building δ and the upper floor of the potter's workshop. The distribution of these storage vessels could possibly offer more insight into crop storage patterns in the settlement, but it is important to point out that such vessels were also frequently re-used. An amphora that originally contained olive oil or wine could be used for years afterwards, for example to store water.⁷⁰

⁶⁵ On the basis of ethnographic research in Turkey, Hillman (1984, 8) has argued that in dry areas it is common practice to store the partially cleaned grain into bulk storage. In areas with wet summers, however, it is the complete spikelets that are put into storage.

⁶⁶ See especially Hillman 1981; 1984b, Boardman and Jones 1990 and more recently Valamoti 2005 and Van Der Veen 2007 on the reconstruction of cereal husbandry from

charred crop remains.

⁶⁷ Zohary and Hopf 2000, 116.

⁶⁸ According to Forti and Stazio (1983, 673) the broad beans from Taras were known for their exceptional quality.

⁶⁹ See above, note 57.

⁷⁰ Cf. Notarstefano 2012, 67.

Obviously, the daily menu would have included animal products as well. Unfortunately, our information about livestock keeping at l'Amastuola is limited, since the archaeozoological remains have not been systematically analyzed yet. The preliminary excavation reports frequently mention finds of sheep/goat bones, as well as some remains of cattle.⁷¹ Evidently, the inhabitants' diet included the occasional consumption of meat, which can also be deduced from the roasting spit that was used in the most recent phase of the potter's workshop in trench 6. Shells and fish bones, however, are very rare among the faunal remains. The only indication of exploitation of the maritime environment is a large bronze fish-hook (*Fig. 2.19*), which was found in the same context as the deer bones in trench 6.

2.5.3 GRAPE AND OLIVE CULTIVATION

Archaeological evidence for the production of olive oil and wine, such as pressing stones and fermentation tanks, is absent at l'Amastuola. But it is important to keep in mind that archaeological remains of olive oil and wine production (indeed, of all agricultural production processes) are notoriously scarce anywhere in the Mediterranean.⁷² Furthermore, there are a few indications of olive and grape *consumption*. This evidence is primarily found in the form of transport amphorae, which were used to import liquid bulk goods, probably wine and olive oil, from eastern Greece.⁷³ Small oil flasks, which are likely to have contained perfumed oil, were also among the finds.⁷⁴ Furthermore, almost all of the pottery finds from the burnt deposit in trench 6 represent vase shapes that can be associated with wine consumption. According to Burgers and Crielaard, imported wine, which no doubt was often consumed in connection with imported drinking services, may have been a luxury item that was associated with an elite, 'internationally' oriented lifestyle.⁷⁵

As we have seen above, olive charcoal is omnipresent at l'Amastuola. However, in order to establish whether these olives were cultivated or wild, biometric studies on olive stones are required. Olive macroremains are surprisingly rare at this site and were only found in one context, the cooking pot from the potter's workshop in trench 6. The olive stones in this pot were fragmented (*Fig. 2.27*), which could indicate that they were pounded in order to extract some of the oil, although this would be a very crude way indeed to produce olive oil.⁷⁶ Unfortunately, the stone fragments were too small to

⁷¹ Burgers and Crielaard 2007, 110. Crielaard (2011, 61), mentions the find of an almost complete leg of a goat or sheep under the south wall of *oikos* ε. Unfortunately, no exact numbers can be given yet.

⁷² Foxhall (1993) has given several reasons why olive crushers are seldom recovered in ancient Greek contexts. First, the presses were probably located in the countryside near the olive groves, whereas archaeological research is often focused on settlement areas. Second, much equipment has probably vanished when it was re-used, especially in areas where easily workable stone is scarce. Third, it is also possible that people did not always use archaeologically recognizable olive presses. Depending on their economic circumstances, they might just have used a hole in the ground with pebbles in it, which, after use, would remain virtually invisible in the archaeological record. See also Brun 2004.

⁷³ There is a variety of imported amphorae among the pottery finds from l'Amastuola, originating primarily from

the Gulf of Corinth (Corinthian type A amphorae), but also from adjacent regions in southern Italy (Corinthian type B amphorae, see paragraph 5.3.3). Burgers and Crielaard 2007, 102-104.

⁷⁴ See, for example, the ovoid aryballoids from Trench 2 and Trench 6. Burgers and Crielaard 2007, 103, Crielaard and Burgers 2012, 84 (*Fig. 30e*).

⁷⁵ Burgers and Crielaard 2007, 110.

⁷⁶ Olive oil production involves a long process of grinding, pressing, resting and filtering. Simply grinding a few olives would result in a hardly edible olive paste. Grinded olives need to be pressed to separate the vegetal liquid from the paste, and this liquid still contains a significant amount of water. Traditionally, the olive oil is shed from the water by letting the liquid steep in a container for a certain amount of time, during which the oil will sink and the water float on top. The oil can then be tapped from the bottom of the container, or the water can be skimmed off the top.

carry out any significant biometric measurements. For most of the fragments, it was not possible to measure the exact length and width either. The dimensions of the three largest fragments are included in Table 2.4. It can be observed that the minimal width of these fragments is relatively constant—perhaps suggesting that the olives’ overall dimensions did not show much variety, which is a typical feature of olives that are grafted (i.e., cultivated) rather than grown from seeds.⁷⁷ But that suggestion is based on three measurements only, and obviously needs to be treated with much caution. All in all, it must be concluded that on the basis of the present data, it is impossible to say whether the olive stones that were found at l’Amastuola belonged to the cultivated or wild variety.

Grape remains are equally rare at l’Amastuola. No *Vitis* charcoal at all and only three grape pips (in units 159, 626 and 627) were found. Traditionally, cultivated grapes are distinguished from wild ones by measuring them and calculating the so-called Stummer index.⁷⁸ However, the problem is that the ratios differ between regions, and the extent of overlap between cultivated and spontaneous *Vitis* can be considerable. Furthermore, in the archaeological record seed dimensions can be deformed by different processes of preservation, such as carbonization or mineralization. These problems have caused some authors to express their doubts about the value of the Stummer index for the identification of wild or cultivated grapes.⁷⁹ Indeed, to overcome this problem Mangafa and Kotsakis started an investigation of modern populations of wild and cultivated vines and their carbonization under differing charring conditions.⁸⁰ Their experiments resulted in a new series of formulas, which are particularly useful for the analysis of macroremains that fall within the overlap zone of Stummer’s index, and seem to lead to more reliable results.⁸¹ Unfortunately, one of the three grape pips (from unit 627) was too fragmented to be measured. The other two were relatively small and thin, measuring 5 x 3.2 mm and 4.3 x 2.5 mm, respectively. These measurements make them unsuitable for the Index of Stummer (scores: 64 and 58), but the formulae by Mangafa and Kotsakis seem to qualify them as belonging to the wild variety.⁸² Although the suitability of these formulae can be questioned (see paragraph 4.3.2 and BOX 3), the evidence for grape cultivation at l’Amastuola remains inconclusive.

2.5.4 THE USE OF PLANTS IN RITUAL ACTIVITIES

The excavations on the l’Amastuola hill revealed two deposits, in trench 2 and 6, which appeared to be of ritual origin.⁸³ They are represented in the archaeobotanical analysis by four sampled archaeological units, 509, 513, 229 and 233 (see Table 2.5). Both locations seem to have been used more or less in the same period (i.e. the first half of the 7th century BC) for rituals that involved communal eating and drinking, food sacrifices and the ritual destruction of dining equipment. However, it is interesting to

⁷⁷ Cf. Kislev 1994–1995, 137. See paragraph 5.3.3 for more recent bibliographical references about biometrical analysis of olive stones.

⁷⁸ By calculating the breadth (B) and length (L) index and dividing the two, Stummer (1911) stated that indices between 44 to 53 characterize wild vines and indices between 76 to 83 cultivated ones. Seeds with indices from 54 to 75 could belong to either subspecies.

⁷⁹ Smith and Jones 1990, 322.

⁸⁰ The four formulae by Mangafa and Kotsakis (1996) require measurements of length (L), breadth (B), length of the stalk (LS) and the distance from the base of the

chalaza (the spoon-shaped structure on the dorsal side of a grape pip), to the tip of the stalk (PCH). See BOX 3 and Appendix 5.

⁸¹ Mangafa and Kotsakis 1996, 418.

⁸² The pips from unit 159 and unit 626 scored –2.2 and –1.6, respectively, for Mangafa and Kotsakis’ Formula 1 (lower than –0.2: definitely wild), –2.2 and –1.2 for Formula 2 (lower than –0.2: definitely wild), –2.0 and –1.3 for Formula 3 (lower than 0: definitely wild) and –2.3 and –2 for Formula 4 (lower than –0.9: definitely wild).

⁸³ Burgers and Crielaard 2007, 86–87, Crielaard 2011, 68–75.

note the differences in the type of pottery that was deposited (sub-geometric vs. matt-painted) and the nature of the location (inside vs. outside). Crielaard and Burgers have argued that these differences can perhaps be associated with cultural or ethnic affiliations or identities, meaning that during this early stage of cohabitation at l'Amastuola, Greeks and indigenous populations held their celebrations separately.⁸⁴

Among the macroremains from the deposit in the Iron Age hut in trench 2 were two grains of free-treshing wheat, one of emmer, and three seeds of bitter vetch. However, the most surprising discovery was made in trench 6, i.e. 27 carbonized cloves of garlic, which are the earliest finds in Italy (Fig. 2.28a).⁸⁵ The morphology of these specimens, especially the cell anatomy (which was studied under a Scanning Electron Microscope (SEM)), leaves no doubt about their identification.⁸⁶ As can be seen in Figure 2.28b and c, the SEM photos show a pattern of elongated cells on the surface of the garlic cloves, with straight short cell walls that narrow to one point. The latter feature is diagnostic for *Allium* epidermis, but it is difficult to specify whether the specimens should be identified as garlic (*Allium sativum*), onion (*Allium cepa*) or leek (*Allium porrum*).⁸⁷ Yet if we combine this feature with the clove-like form and the clear stem attachment scars (which are left after the cloves are separated from the stem disc on one end, see Fig. 2.28d), there can be no doubt that these macroremains should, indeed, be identified as garlic.

Garlic is a member of the onion family, Alliaceae, and has been used throughout history for both culinary and medicinal purposes. The wild ancestry of garlic has not been definitely established, but according to Zohary and Hopf, the plant is likely to have originated in the Near East (Turkey, Iran, and Central Asia).⁸⁸ Its presence at l'Amastuola indicates that the use of garlic was known long before the arrival of the Romans in southern Italy, although we do not know whether it was cultivated here, imported or gathered from the wild. The garlic cloves may be interpreted as a food product that was part of the ritual feast that was celebrated here. However, the fact that the ash deposition contained no other macroremains seems to indicate that the garlic cloves had some sort of ritual significance.

In short, these contexts at l'Amastuola show that the ritual offering of food was not uncommon. Indeed, similar food offerings have been found at many other sites in southeast Italy and Greece. I will discuss these in Chapter 5, where I will also further elaborate on the possible ritual significance of some foodstuffs in particular, including garlic.

2.6 SUMMARY AND CONCLUSION

The results of this first case study supply information about several important aspects of everyday life at l'Amastuola. I focused on a combination of archaeological, archaeobotanical and archaeozoological data to demonstrate what use the inhabitants made of plants, animals and vegetable products. The first research aspect I discussed was the use of wood. As we have seen, the charcoal assemblage in hearths and fireplaces suggests that olive and oak wood were possibly deliberately selected as fuel. More than

⁸⁴ Crielaard and Burgers 2010; 2012, 98.

⁸⁵ Helmut Kroll's database of literature (1981-2004) on archaeological plant remains (www.archaeobotany.de) only reports finds in Medieval (Castiglioni, Cottini and Rottoli 1999) and Roman (Castelletti, Castiglioni and Rottoli 2001, Rottoli 2002, 237) northern Italy. Prof. Mauro Rottoli of the Laboratorio di Archeobiologia dei Musei Civici di Como informed me that to his knowledge, the earliest garlic finds in northern Italy are

from Roman Imperial times. Additional bibliographical research only yielded one garlic find in southern Italy, from the Casa dell'Alcova at Herculaneum (Jashemski and Meyer 2002, 87-88). The cloves from l'Amastuola are more than 600 years older.

⁸⁶ The SEM photos were made by Lucy Kubiak-Martens, to whom I am much obliged.

⁸⁷ Cf. Kubiak-Martens 2002, Fig. 2b, Tomlinson 1991.

⁸⁸ Zohary and Hopf 2000, 195-196.

two thirds of the charcoal collection consists of these wood types. Other species that were found included *Erica*, *Rhamnus/Phillyrea*, *Juniperus*, *Pistacia* and *Arbutus unedo*. Unfortunately, the indications for the use of wood as construction material are too scant to draw firm conclusions. The same holds true for the possible evidence of charcoal production at l'Amastuola.

The archaeobotanical data also supplied information about the consumption and preparation of food at l'Amastuola. The plant part of the diet seems to have consisted mainly of hulled barley and wheat, and fruits such as olives and possibly grapes, strawberry tree berries and crab apples. Pulses were also found in considerable amounts, most notably bitter vetch, which seems to have been a regular part of everyday meals. Hulled cereals probably played a more important role than free-threshing wheat. Cereal weeds also made up a rather significant part of the macroremains assemblage, but only weeds of roughly the same grain size as wheat and barley were found, perhaps indicating that these escaped the cleaning process of sieving. In any case, the find of some brome grass seeds in a cooking pot indicates that weed grains were not always removed, and were consumed together with cereals.

The presence of transport amphorae leaves little doubt that wine and olive oil were also consumed at l'Amastuola. However, there is no archaeological evidence of local olei- and viticulture. The archaeobotanical evidence also remains inconclusive, especially with regard to wine production, since no *Vitis* charcoal and only three grape pips were found. Olive macroremains are equally rare. Olive charcoal, on the other hand, is omnipresent at l'Amastuola. There are two possible explanations for this phenomenon. Either this olive wood was collected from wild trees, or it consisted of prunings from cultivated olive trees. I will return to this issue in Chapter 4, when I discuss the surrounding landscape and rural economy of l'Amastuola.

Finally, I discussed the use of plants in ritual activities by comparing two intentional deposits that appeared to be of cultic character, in trench 2 and trench 6. Although these two deposits are considerably different in nature, their presence shows that food sacrifices were common during the early habitation phases of l'Amastuola. In these cases, the offerings included cereals, pulses and garlic.

In conclusion, the picture that emerges from the results at l'Amastuola is that of a small community that cultivated a wide array of crops (cereals, pulses, fruits). While it is true that most of the charcoal collection consisted of olive and oak wood, the presence of at least five other wood types suggests that the inhabitants did not go to great lengths to collect or import suitable fuel wood. These results give rise to a number of questions. Now that we have seen what types of crops were consumed and how these were prepared, we should take a look at where they were grown. Was the settlement at l'Amastuola surrounded by arable fields? What did these fields look like? What was the scale of production on these fields? Did agricultural production aim at subsistence, or was an agricultural surplus produced? Moreover, the findings about the use of wood as fuel also pose several questions. Where was this wood collected? Why were these particular wood species selected? If there were others, which ones? These issues will be discussed in Chapter 4, in which I take a closer look at the landscape and land use at l'Amastuola.

TABLES CHAPTER 2

Table 2.1 l'Amastuola, charcoal from contexts that can be associated with hearths or furnaces

Trench Unit Context Structure Date	2 265 hearth? IA hut VIII-VII BC	2 274 fill of /265\ VI BC	3 112 furnace oikos γ VI BC	4 148 oven building δ VI BC	4 166 = /170\ VI BC	4 170 oven oikos ε VI BC	5 32 hearth building ζ VI BC	
taxa								common name
Arbutus unedo	1							strawberry tree
Erica sp.		31						heath
Juniperus sp.					4			juniper
Olea europaea	18	5	6	12	3	6	11	olive
Quercus (deciduous type)							3	oak
Quercus (evergreen type)	1	1					3	oak
Quercus sp.	2				3			oak
Pistacia cf. len- tiscus.								mastic
Rhamnus/ Phillyrea		1						Rhamnus/ Phillyrea
unidentifiable hard- wood	5	36						unidentifiable hardwood

Trench Unit Context Structure Date	6 332 = /335\ VI BC	6 335 kiln E workshop VI BC	6 346 ash kiln D workshop VI BC	6 373 ash kiln E workshop VI BC	5 33 fireplace building ζ VI BC	6 537 kiln? - ?	6 542 ash connected with /537? VI BC	
taxa								common name
Arbutus unedo		1						strawberry tree
Erica sp.								heath
Juniperus sp.	3							juniper
Olea europaea	17		1		13	19	5	olive
Quercus (deciduous type)					2		118	oak
Quercus (evergreen type)								oak
Quercus sp.						28		oak
Pistacia cf. len- tiscus.	3							mastic
Rhamnus/ Phillyrea	3	4	3			1	2	Rhamnus/ Phillyrea
unidentifiable hard- wood		2		10		11	1	unidentifiable hardwood

Table 2.2 l'Amastuola, macroremains from contexts that can be associated with possible ovens in *oikos* γ and building δ

Trench Unit Context Structure Date	3 105 outdoor surface near oven oikos γ VI BC	4 144 refuse dump oven building δ VI BC	4 148 oven building δ VI BC	
taxa				common name
Hordeum vulgare	1	112		hulled barley
Triticum aestivum/compactum		1		free-threshing wheat
Triticum dicoccum	1	24	1	emmer wheat
Cerealia		39		cereals
Lens culinaris		1		lentil
Vicia ervilia		8		bitter vetch
Vicia sp.		5		vetch
Avena sp.		13		oat
Medicago hispida		1		bur medick
subrecent contaminations		*		

Table 2.3 l'Amastuola, macroremains from cooking pot and storage jar

Trench Unit Container Structure Date	3 107 storage jar - mid VII BC	6 313 cooking pot living space V BC	
taxa			common name
Hordeum vulgare		170	hulled barley
Triticum aestivum/compactum		1	free-threshing wheat
Triticum dicoccum		20	emmer wheat
Triticum sp.		2	wheat
Cerealia		70	cereals
Olea europaea		10	olive
Vicia faba var. minor		1	broad bean
Vicia ervilia	685	1	bitter vetch
Fabaceae		4	legumes
Bromus sp.		3	brome

Table 2.4 l'Amastuola, measurements of olive stone fragments from unit 313 lot 877 (cooking pot, 5th century BC)

	minimal length (mm)	minimal width (mm)
Fragment 1	7	4
Fragment 2	5.5	5
Fragment 3	3.5	5

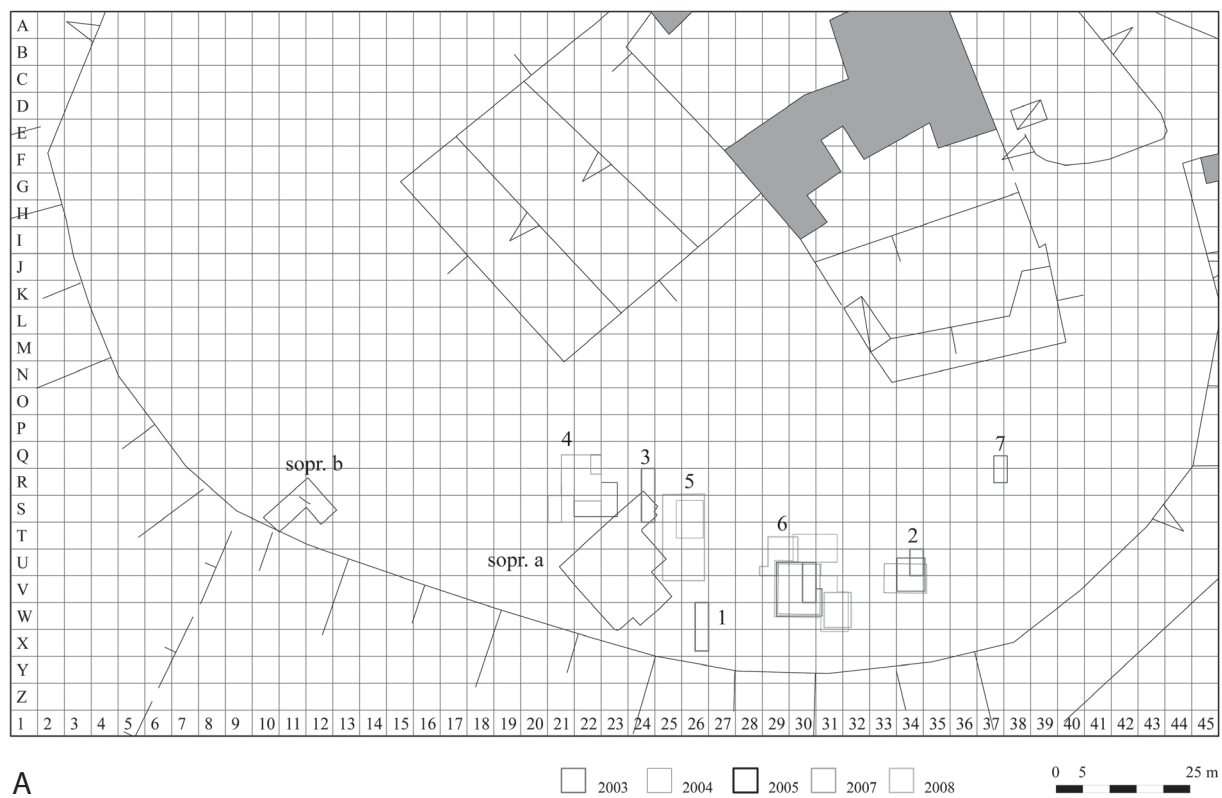
Table 2.5 l'Amastuola, charcoal and macroremains from ritual depositions

Trench Unit Context Structure Date	2 229 ritual deposition IA hut mid VII BC	2 233 = /229\ IA hut mid VII BC	6 509 around/beneath /513\ ritual meal deposition 1st half VII BC	6 513 ritual deposition ritual meal deposition 1st half VII BC	
charcoal					common name
Olea europaea	13		2		olive
Quercus (deciduous type)		5			oak
Quercus (evergreen type)		1		158	oak
Quercus sp.	4				oak
unidentifiable hardwood				19	unidentifiable hard- wood
seeds and fruits					
Allium sativum				27	garlic
Triticum aestivum/compactum	2				free-threshing wheat
Triticum dicoccum	1				emmer wheat
Vicia ervilia	3				bitter vetch

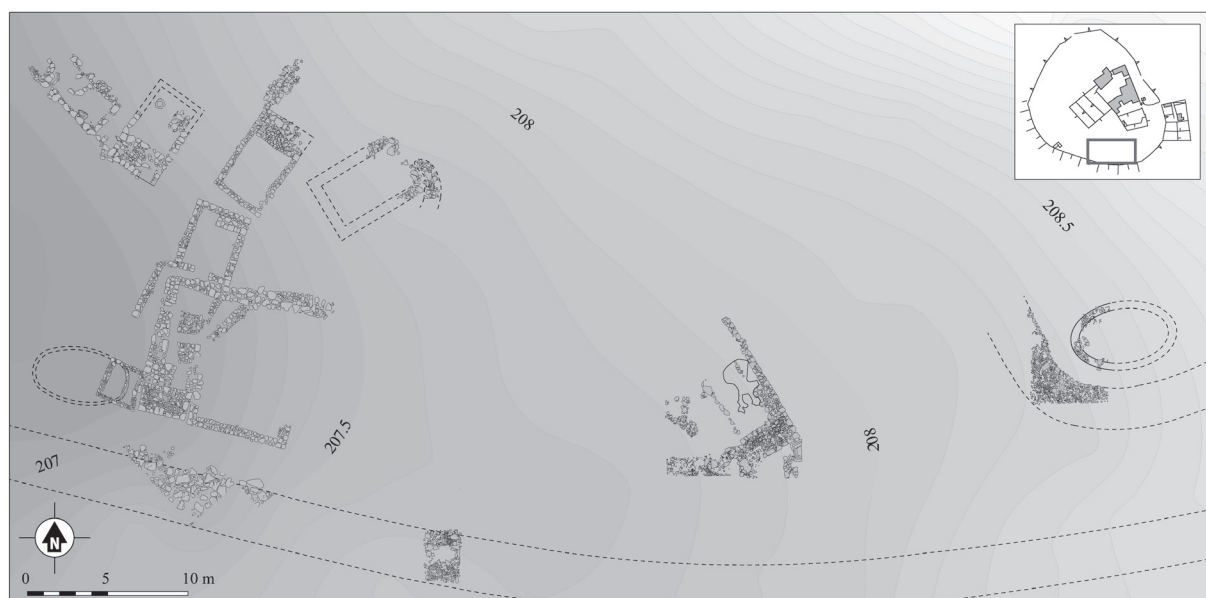
FIGURES CHAPTER 2



2.1 Aerial view of the l'Amastuola hilltop.

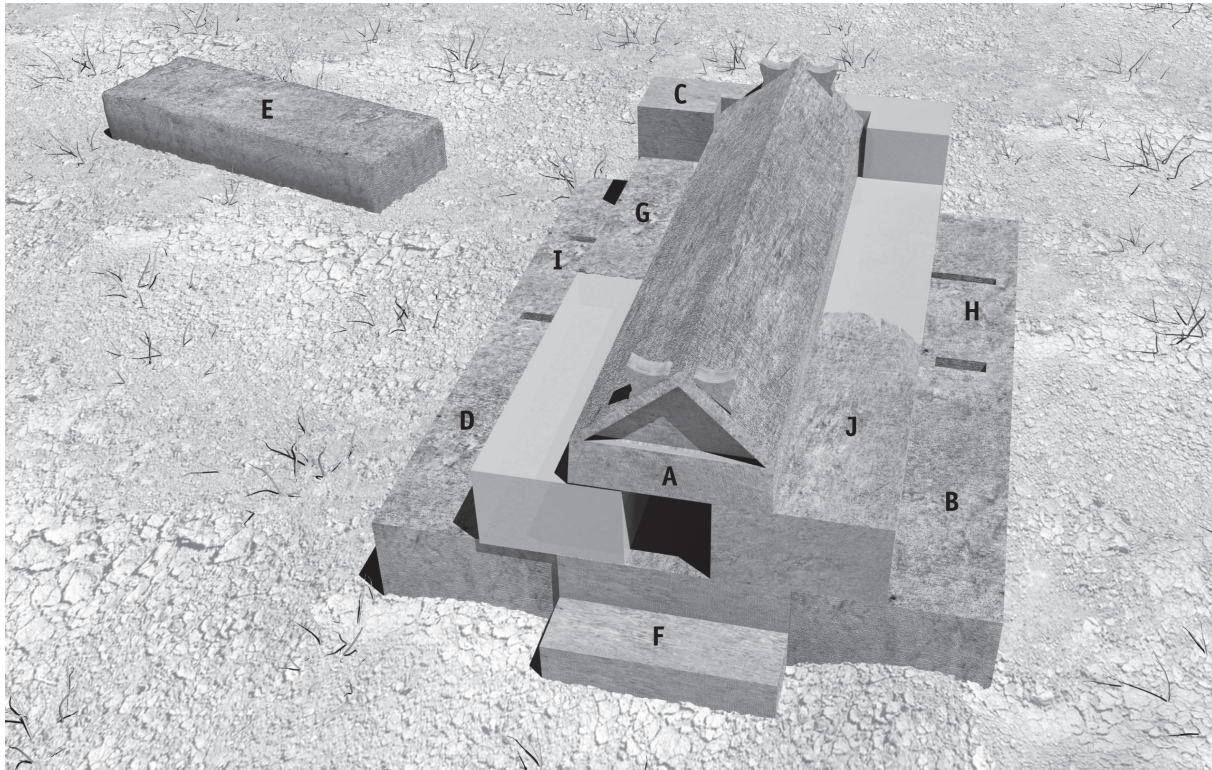


A

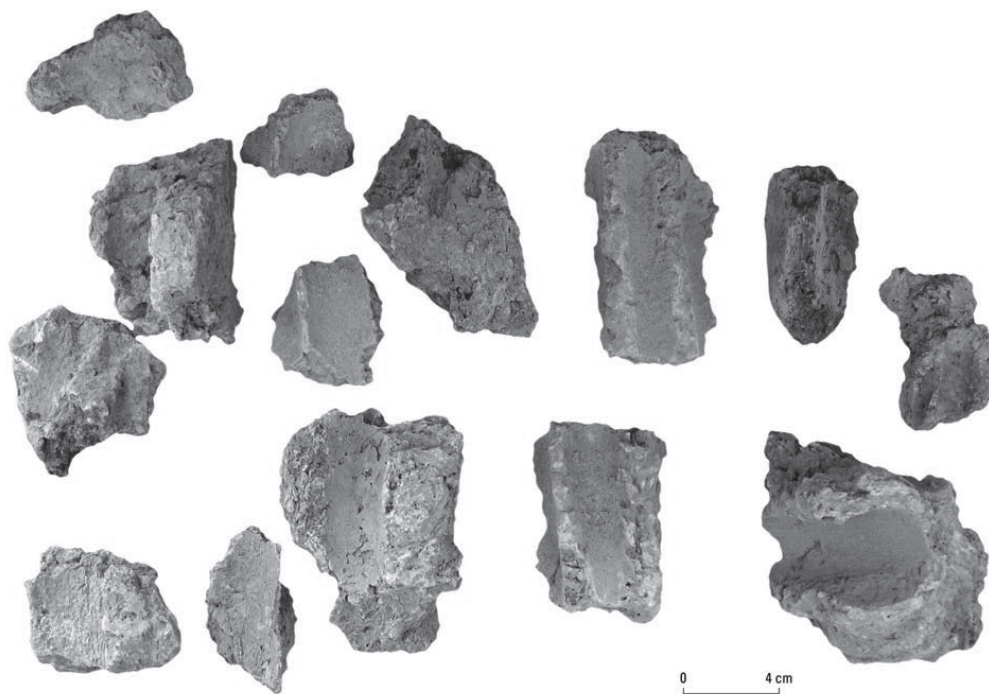


B

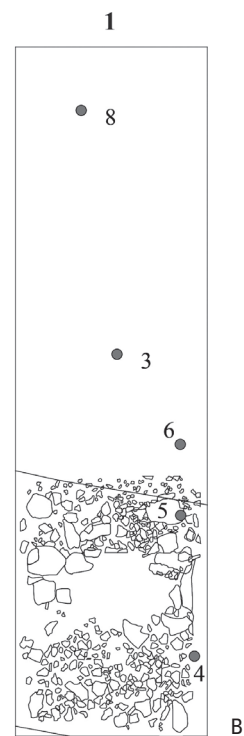
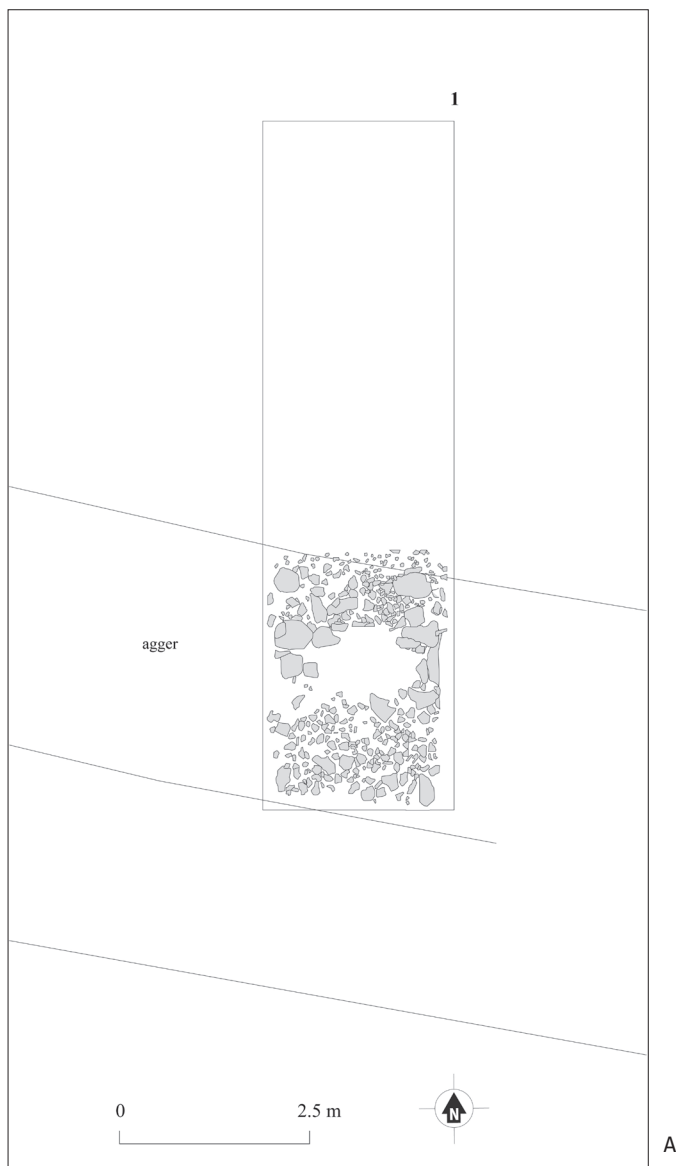
2.2 A and B L'Amastuola, south terrace: location of the excavation trenches.



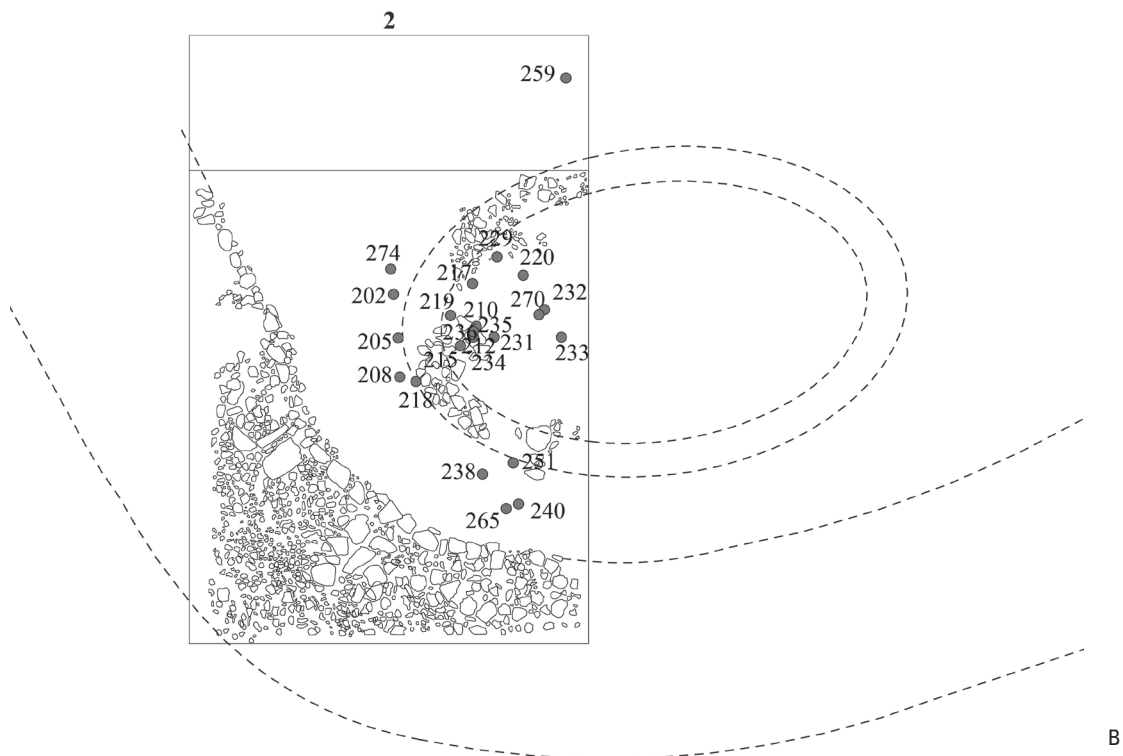
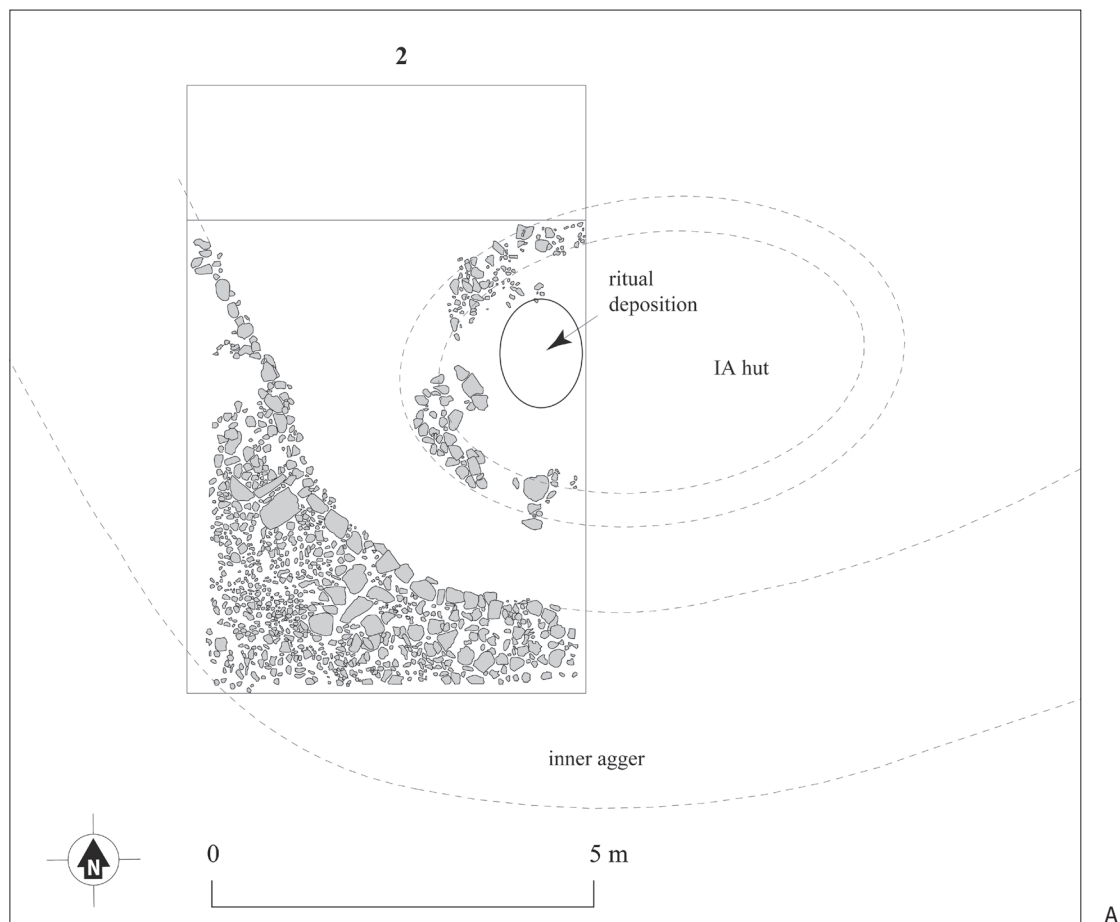
2.3 L'Amastuola, trench 6: digital reconstruction of the cultic structure by Bert Brouwenstijn.



2.4 L'Amastuola, trench 4: burnt loam showing wood impressions.



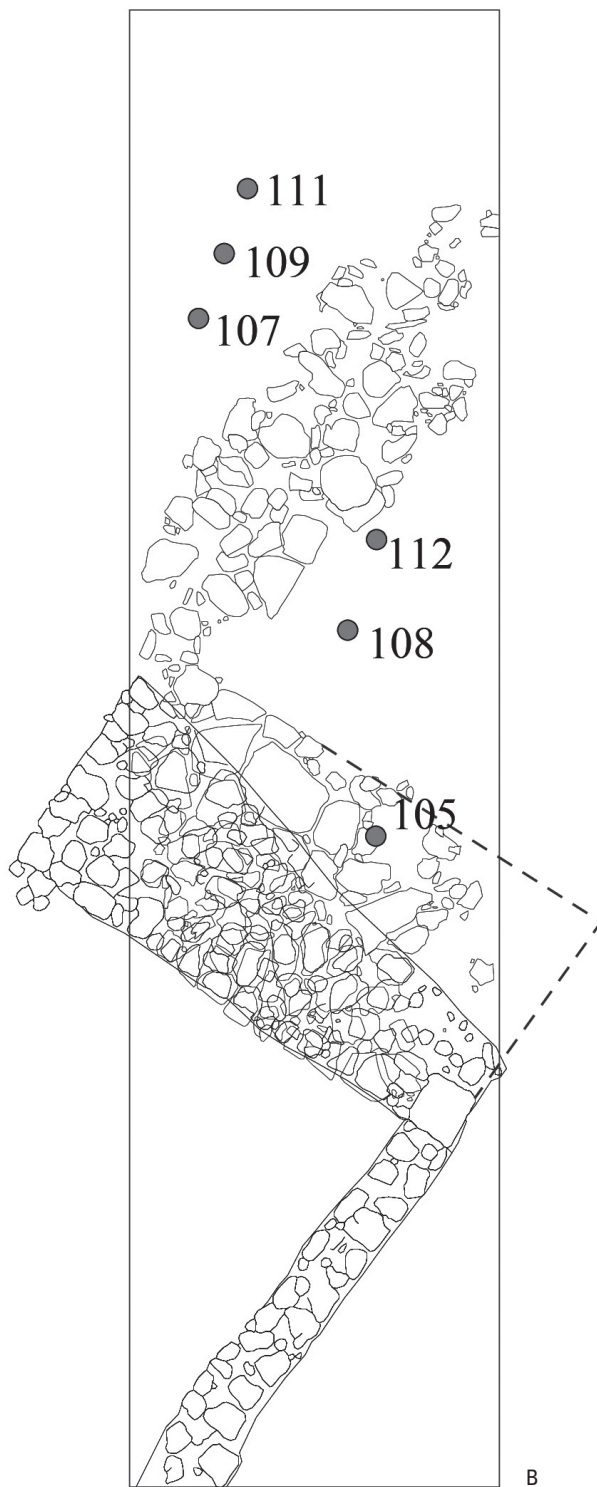
2.5 A L'Amastuola, trench 1: location of the archaeological finds;
B location of the archaeologicalobotanical samples.



2.6 A L'Amastuola, trench 2: location of the archaeological finds;
B location of the archaeobotanical samples.

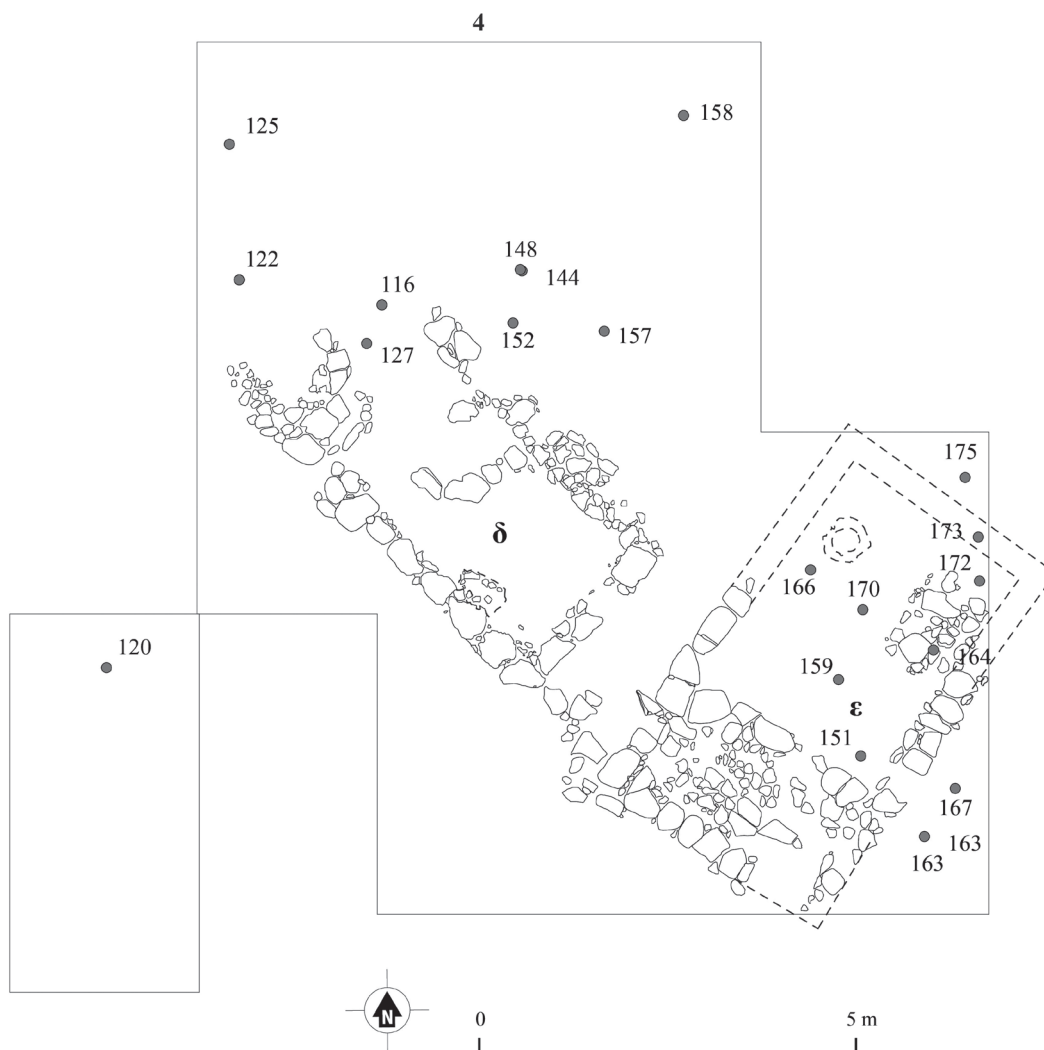


2.7 A L'Amastuola, trench 3: location of the archaeological finds;
B location of the archaeobotanical samples.





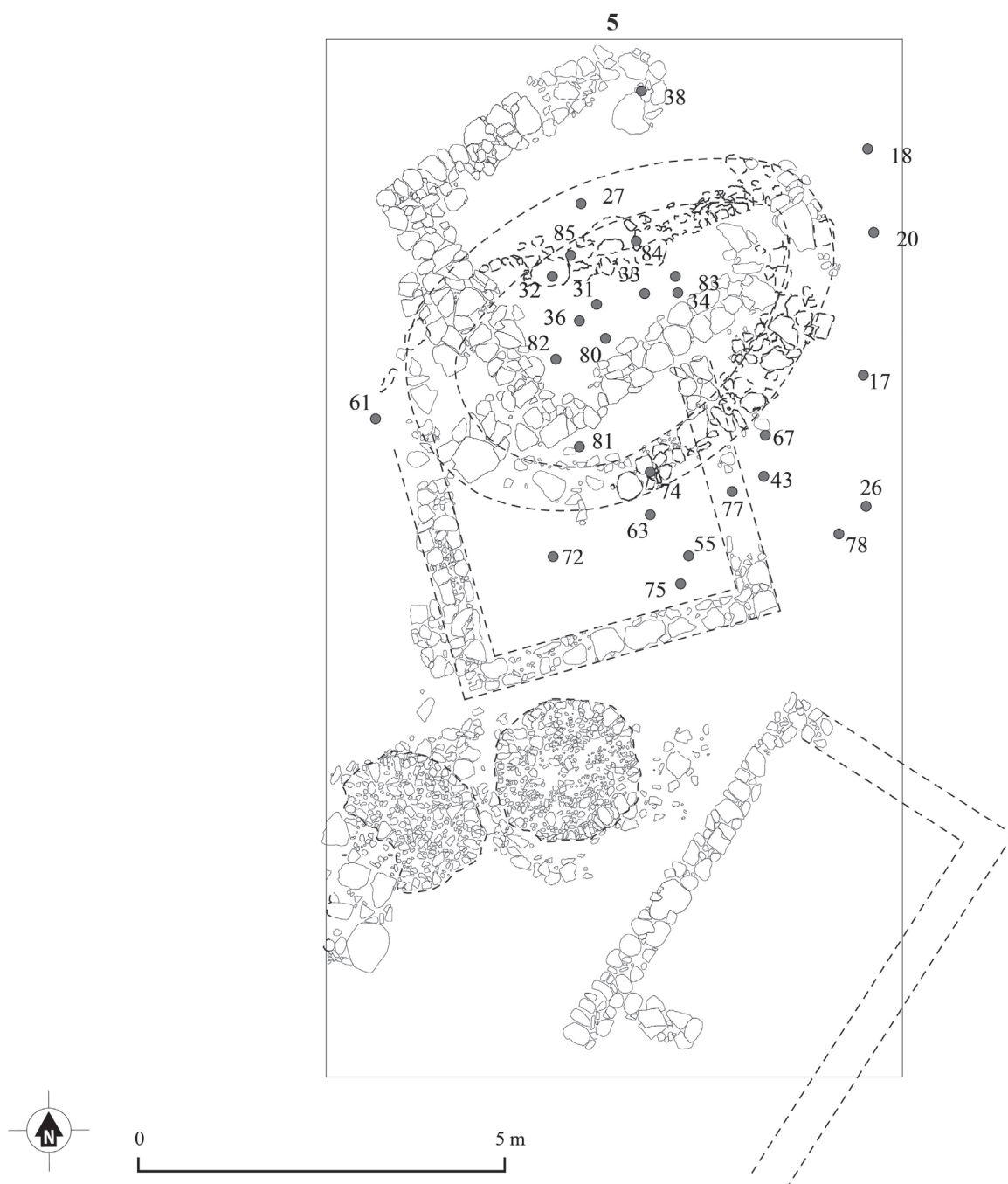
2.8 A L'Amastuola, trench 4: location of the archaeological finds.



2.8 B L'Amastuola, trench 4: location of the archaeobotanical samples.



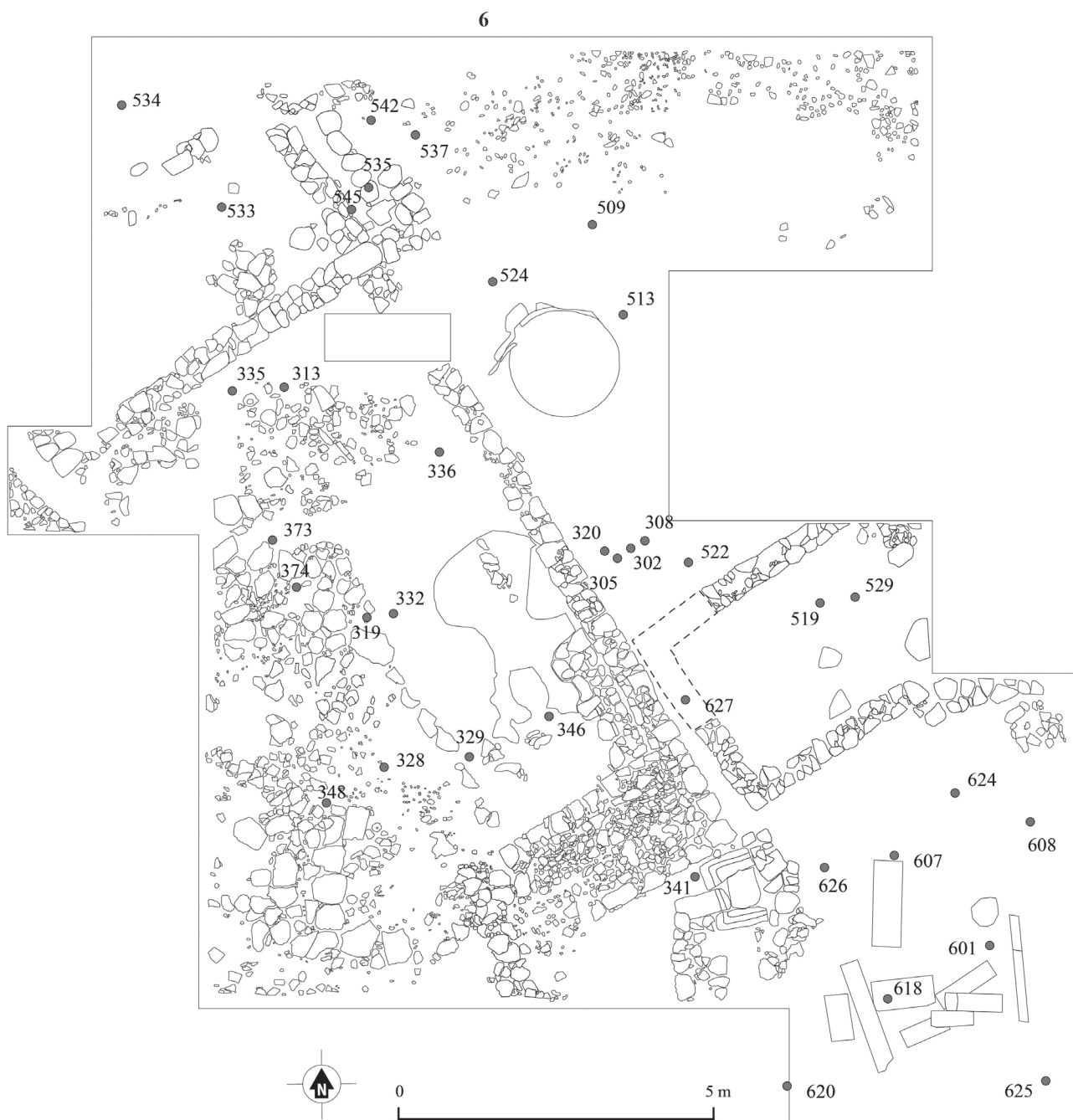
2.9 A L'Amastuola, trench 5: location of the archaeological finds.



2.9 B L'Amastuola, trench 5: location of the archaeobotanical samples.



2.10 A L'Amastuola, trench 6. location of the archaeological finds.



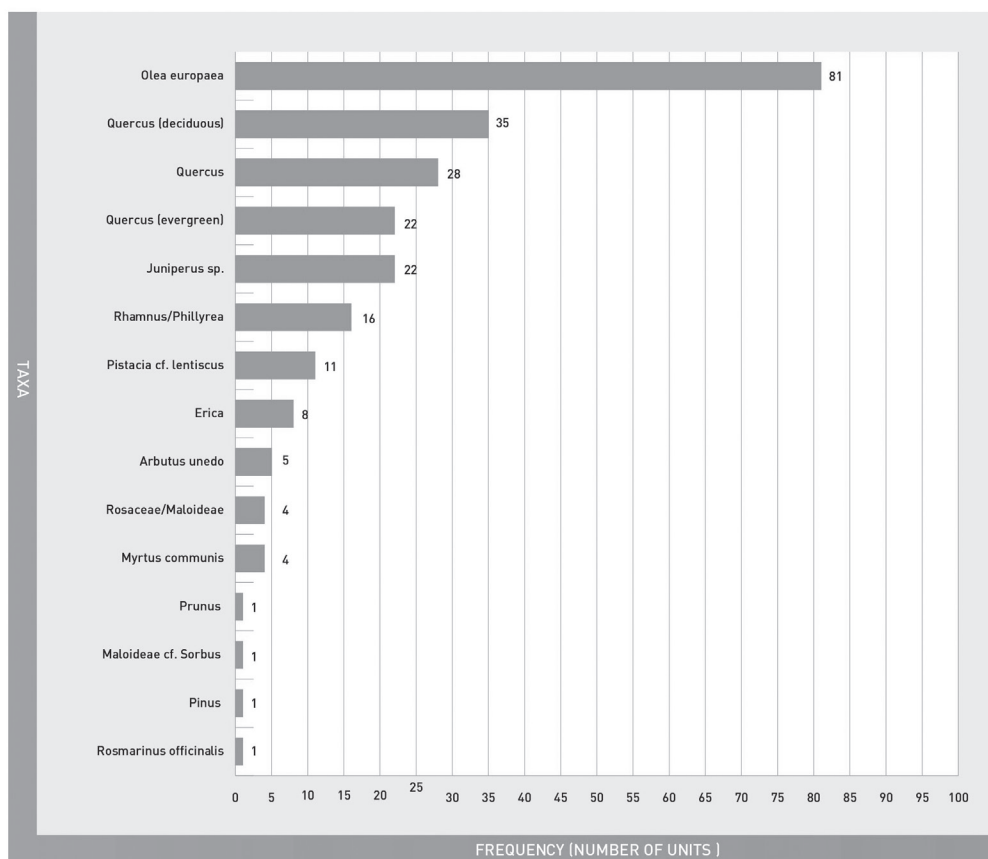
2.10 B L'Amastuola, trench 6: location of the archaeobotanical samples.



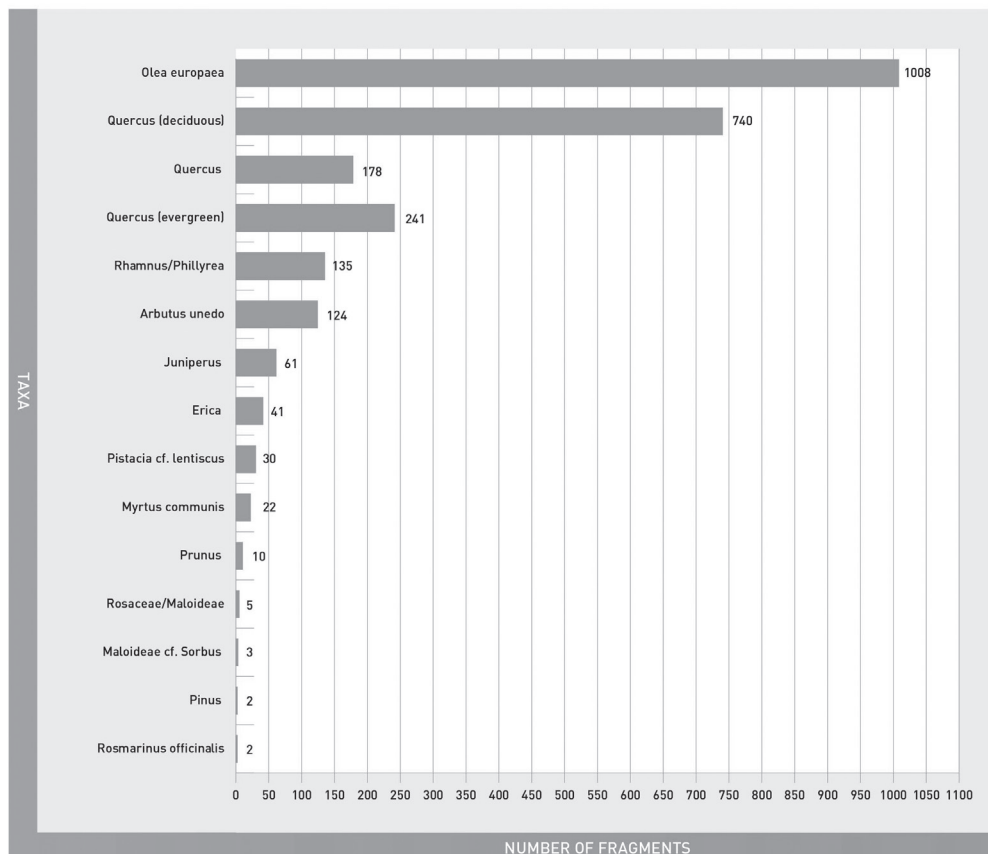
2.11 L'Amastuola, trench 6: black semicircular area (units 501 and 510).



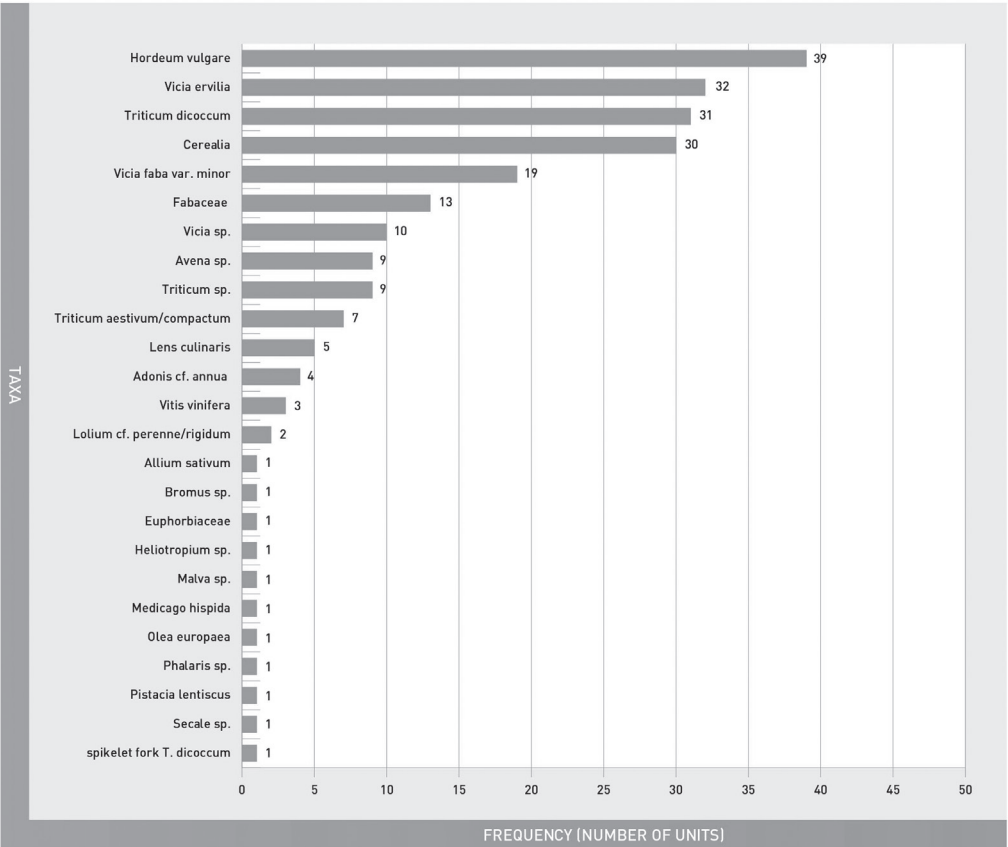
2.12 L'Amastuola, trench 5: possible silos for grain storage.



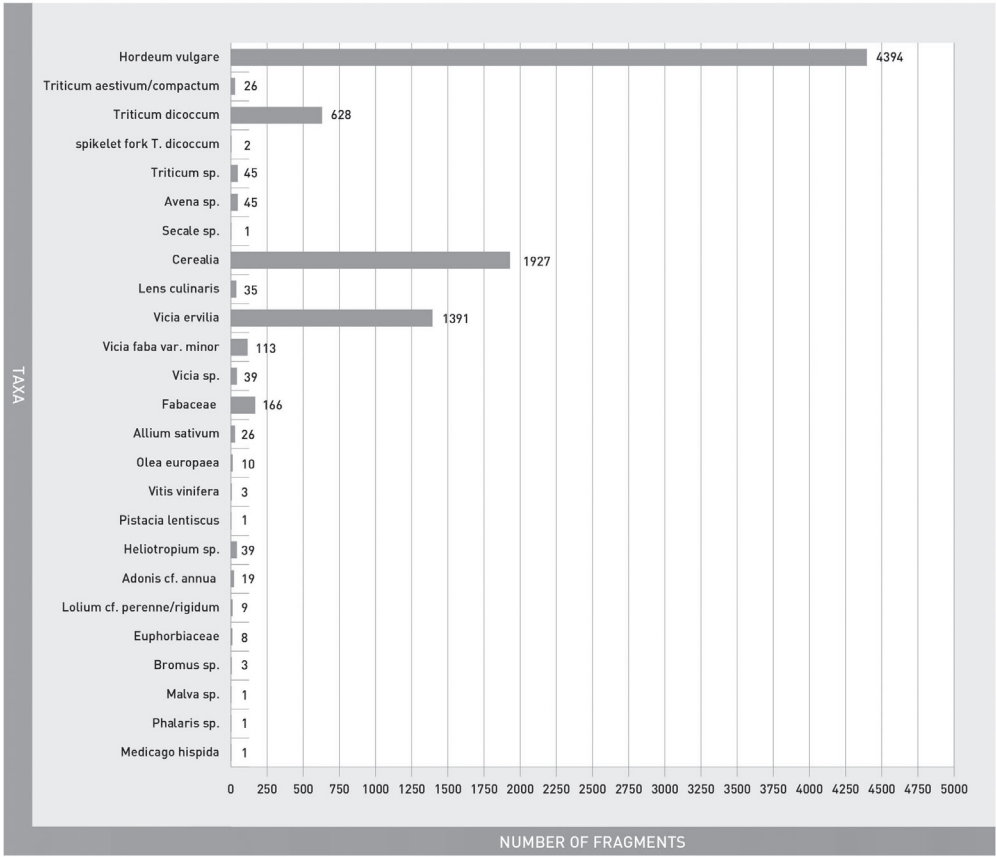
2.13 L'Amastuola, results of the charcoal analysis: frequency of wood taxa (i.e. the number of stratigraphical units in which it was found).



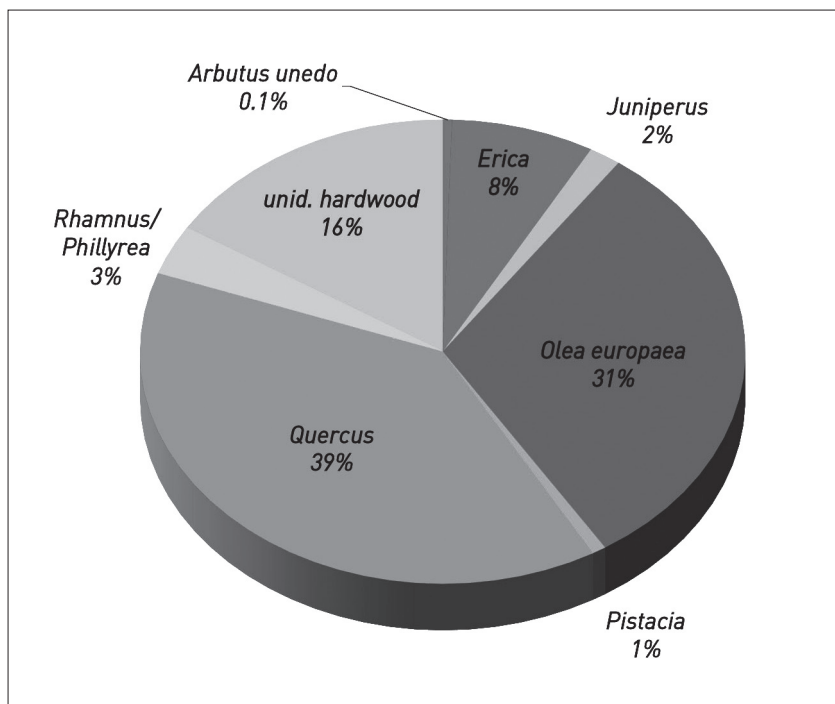
2.14 L'Amastuola, results of the charcoal analysis: total number of fragments of wood taxa.



2.15 L'Amastuola, results of the analysis of seeds and fruits: frequencies.



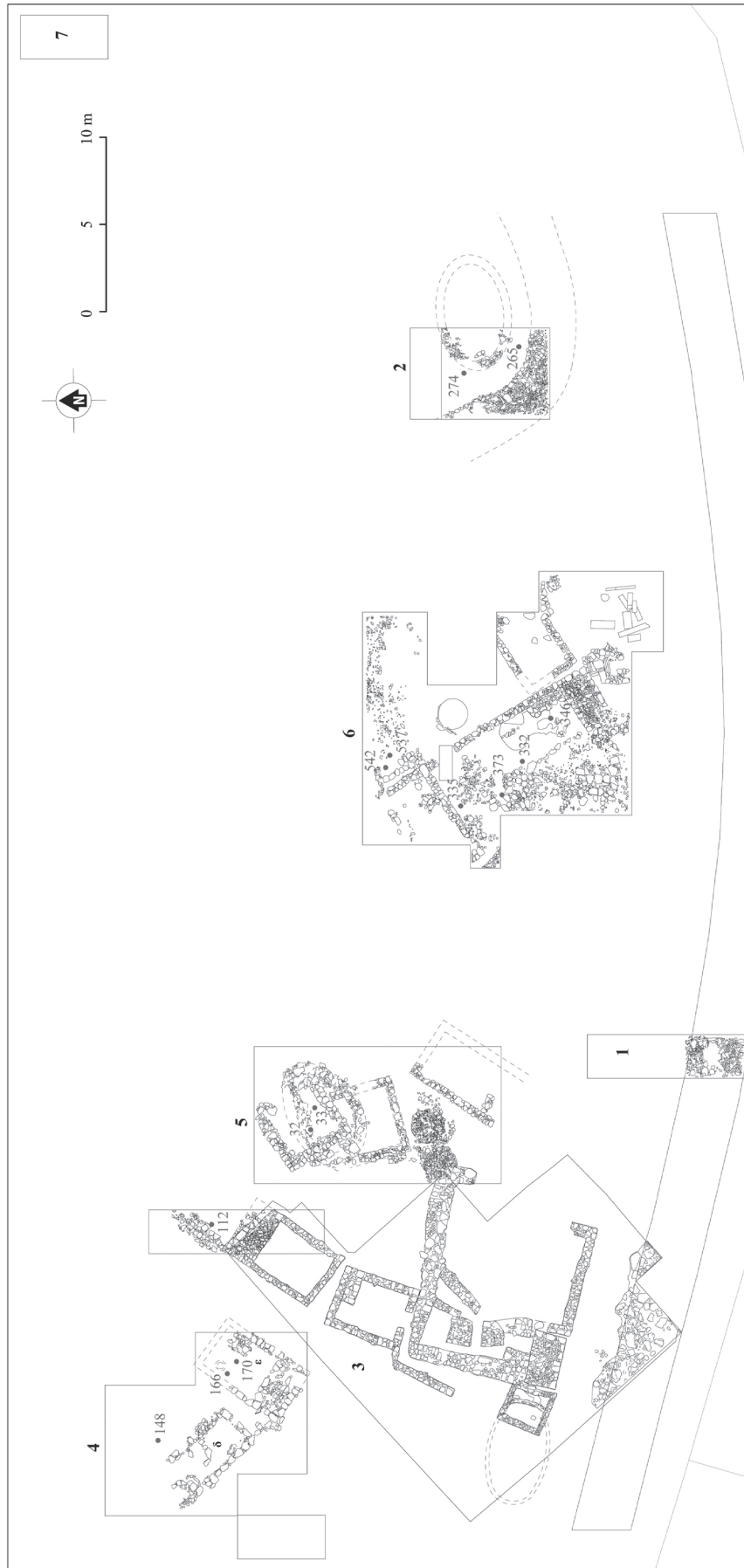
2.16 L'Amastuola, results of the analysis of seeds and fruits: total number of fragments.



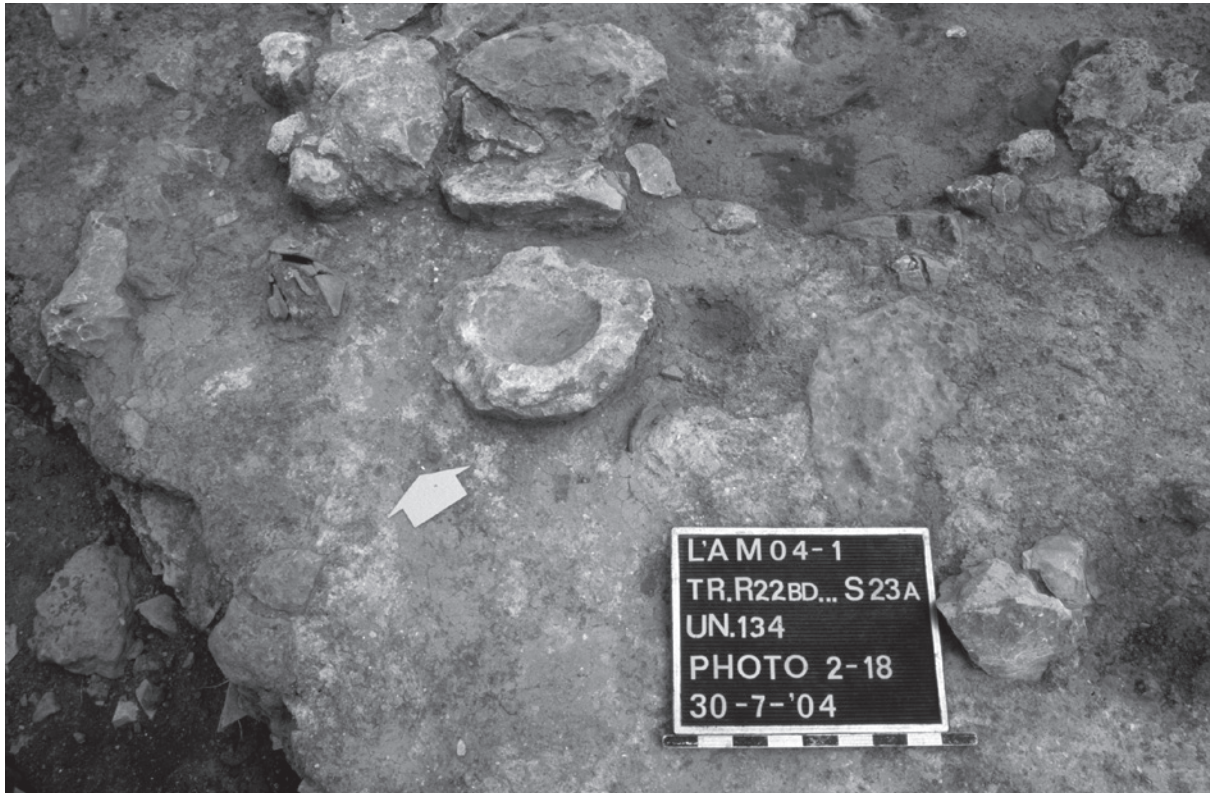
2.17 L'Amastuola, results of the charcoal analysis: wood taxa from hearths and fireplaces (fuel?).



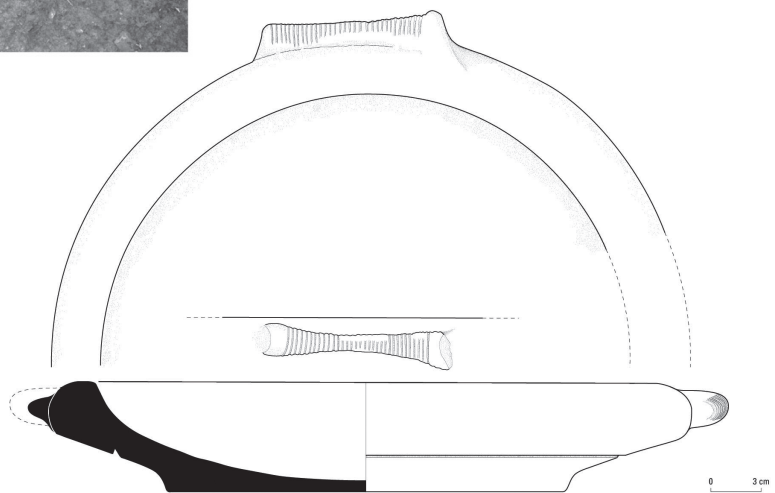
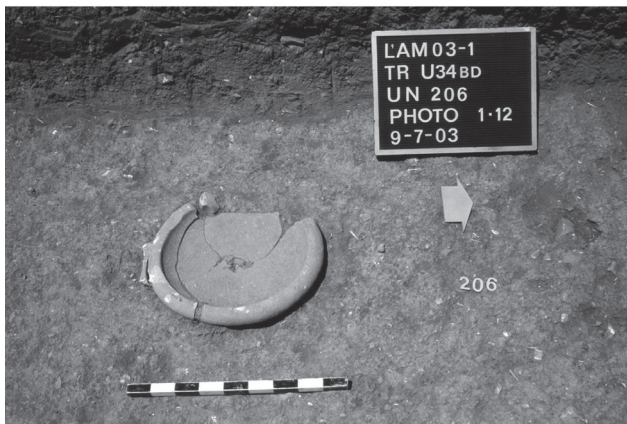
2.19 L'Amastuola, trench 6: bronze fish-hook.



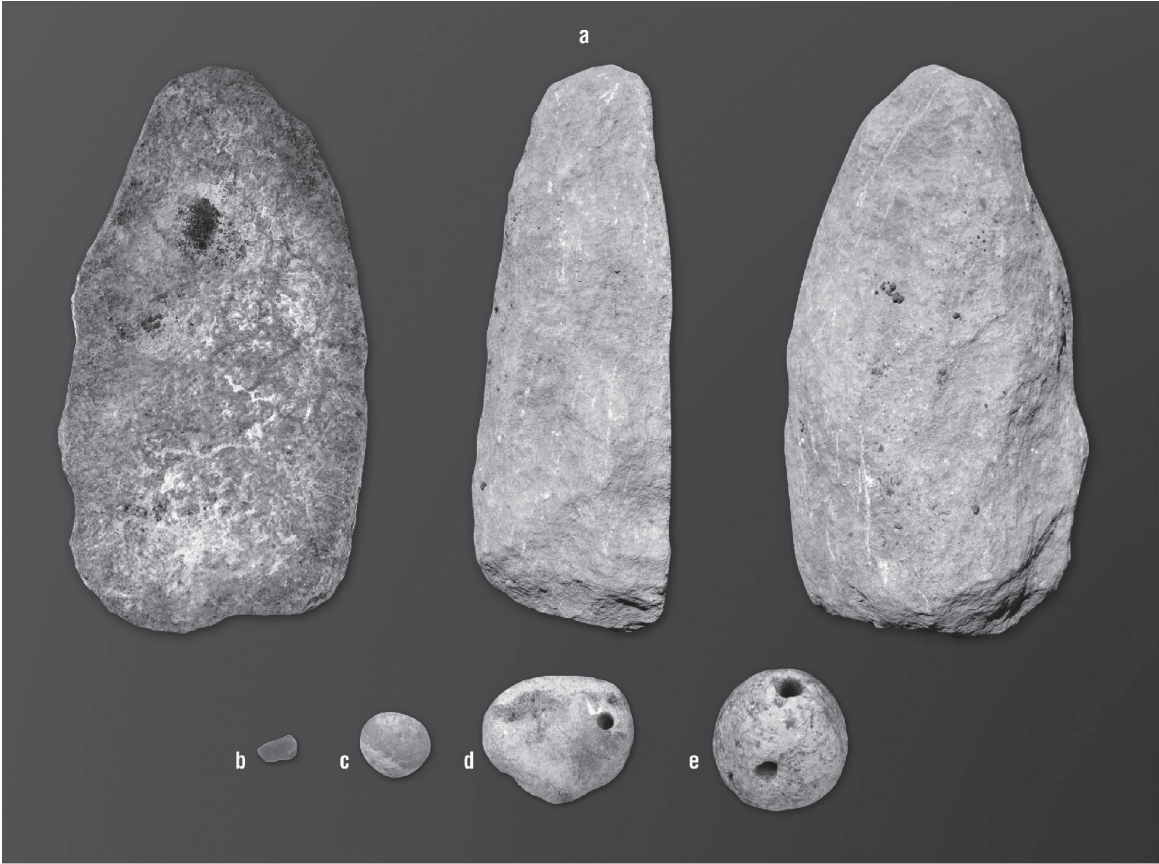
2.18 L'Amastuola, south terrace: location of the samples from hearths and fireplaces (units 265, 274, 112, 148, 166, 170, 32, 33, 332, 335, 346, 373, 537, 542).



2.20 L'Amastuola, trench 4: stone mortar from building δ .



2.21 L'Amastuola, trench 2: terracotta mortar from the colluvium layer.



2.22 L'Amastuola, all trenches: grinding stones.

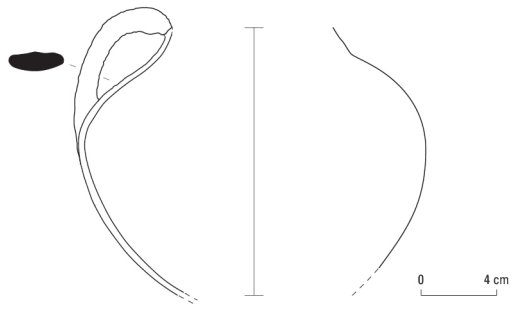


2.23 Decorations on Daunian stelai showing cereal parching with mortars and pestles.

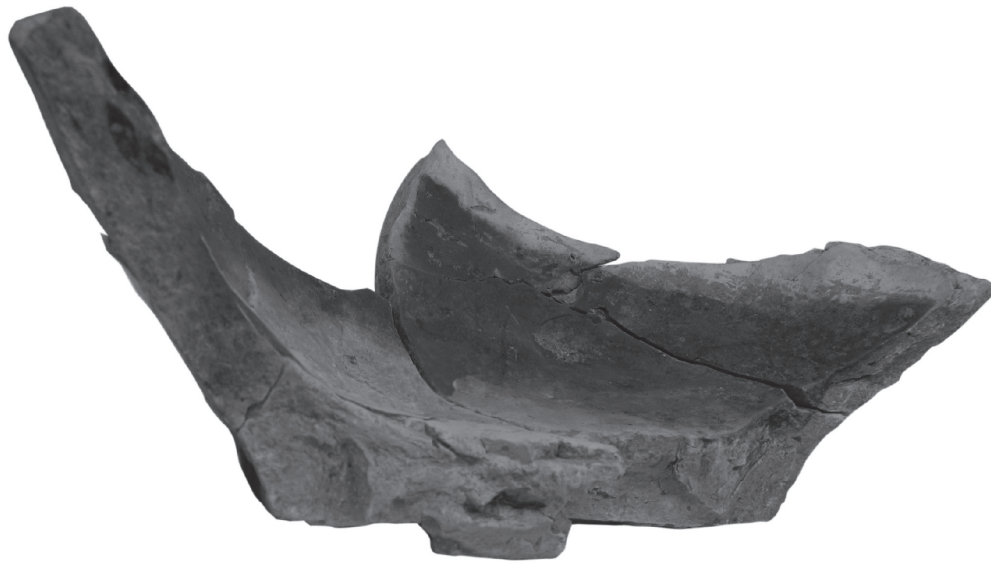




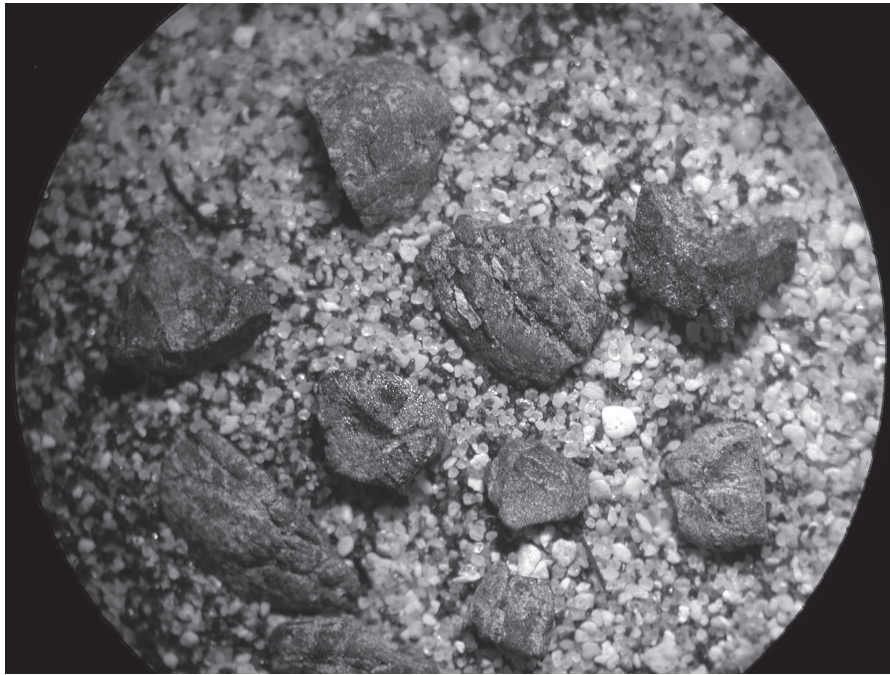
2.24 A L'Amastuola, south of the hill: stone mortar;
 B San Pancrazio Salentino, Apulia: stone mortar of unknown origin.



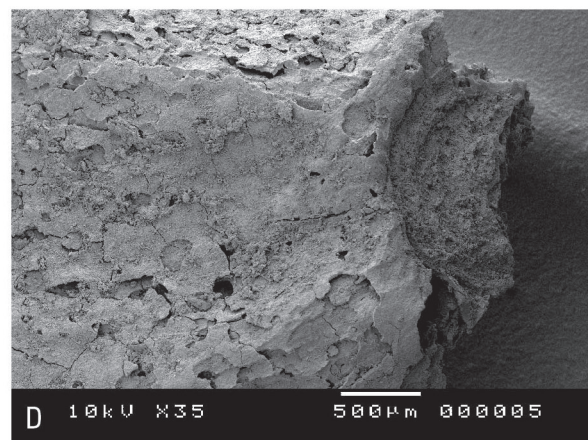
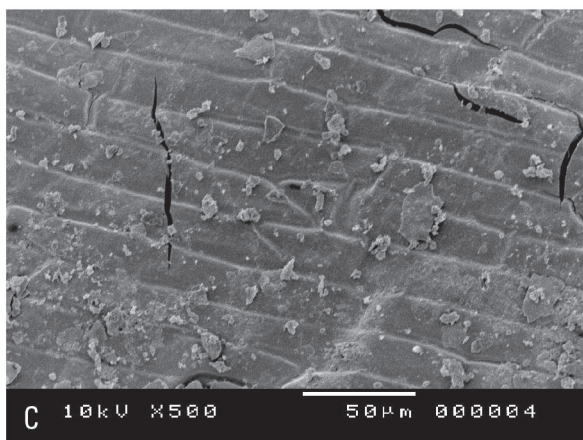
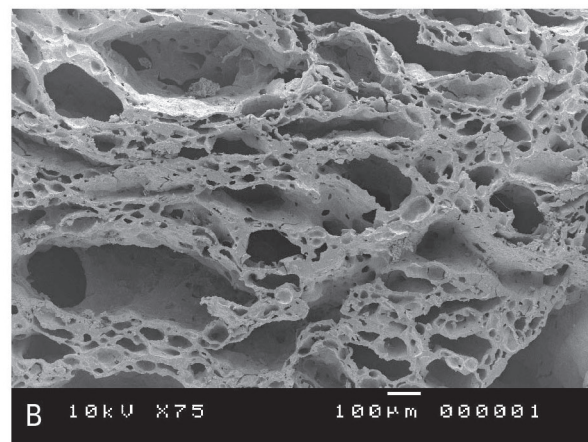
2.25 L'Amastuola, trench 6: cooking pot with rounded base and relatively narrow neck.



2.26 L'Amastuola, trench 3, unit 107: storage jar.



2.27 L'Amastuola, trench 6:
fragmented olive stones from
cooking pot.



2.28 A L'Amastuola, trench 6: carbonized garlic cloves (*Allium sativum*); B SEM image showing epidermal surface; C SEM image showing epidermal surface; D SEM image showing attachment scar.